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Chronology of KSC and KSC Related Events for 1986

National Aeronautics and
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John F. Kennedy Space Center

NASA

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CHRONOLOGY OF
KSC AND KSC-RELATED
EVENTS FOR
1986
SELECTED

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New World Services, Inc.
ARCHIVIST

FOREWORD

This chronology is published to fulfill the requirements of KMI 2700.1 (as revised) to describe and document KSC's role in NASA progress.

Materials for this chronology were selected from a number of published sources. The document records KSC events of interest to historians and other researchers. Arrangement is by month; items are by date of the published sources. Actual date of the event may be indicated in parenthesis when the article does not make that information explicit.

Materials were researched and prepared for publication by Historian-Archivist Ken Nail, Jr., with the assistance of Elaine Liston, both of New World Services, Inc., EG&G subcontractor for KSC Library Services.

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J. E. Pryor
Center Services

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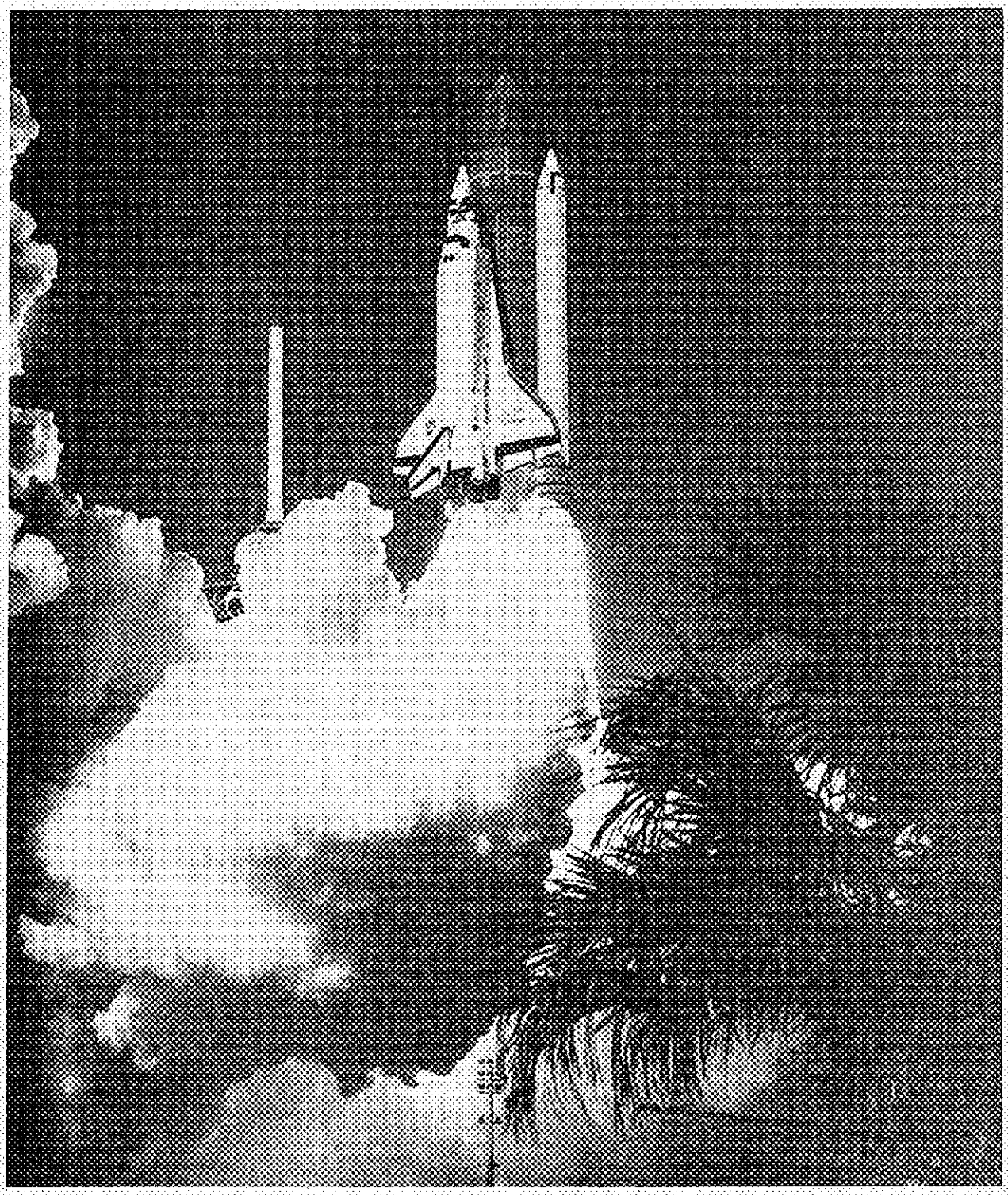
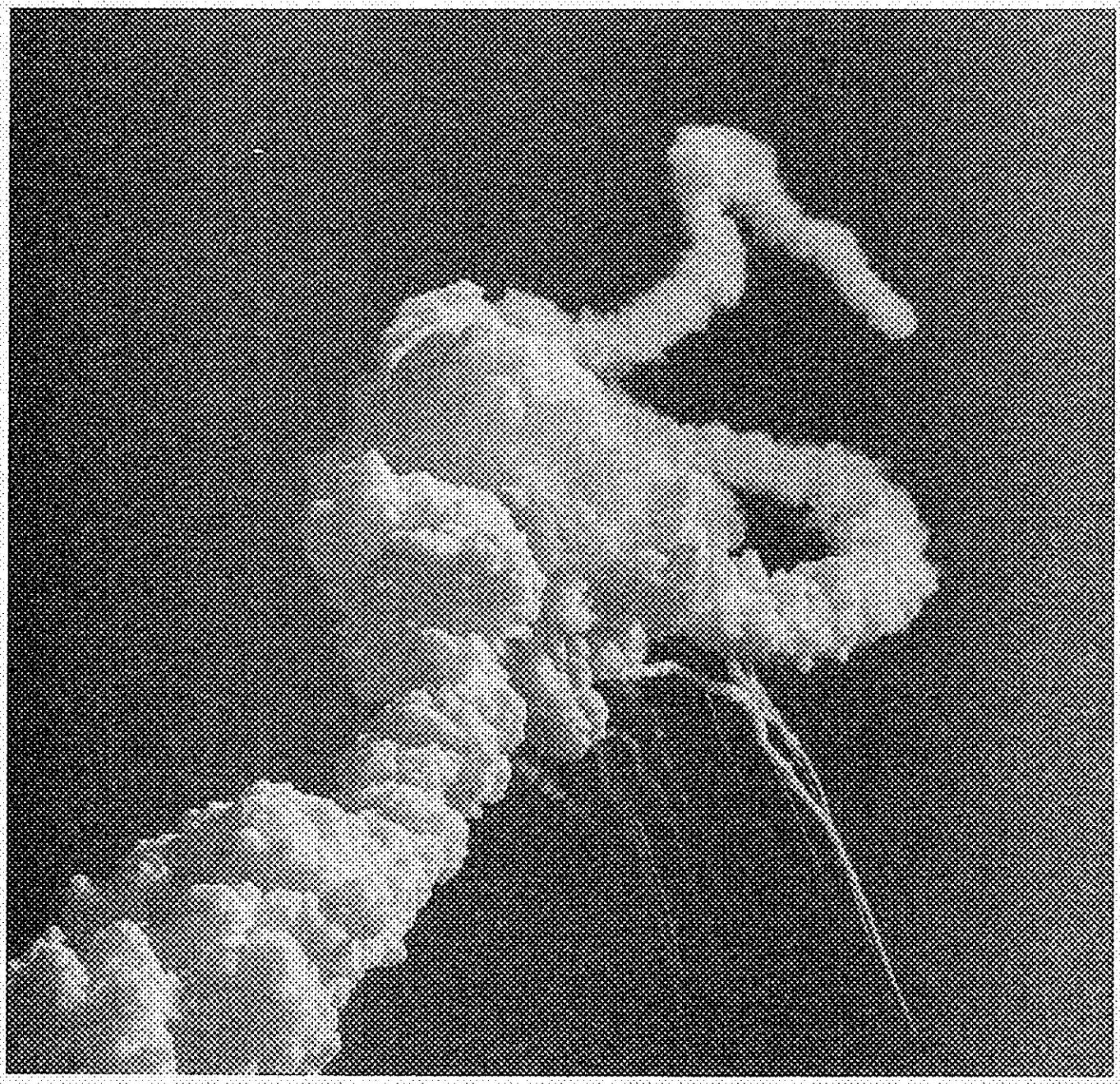
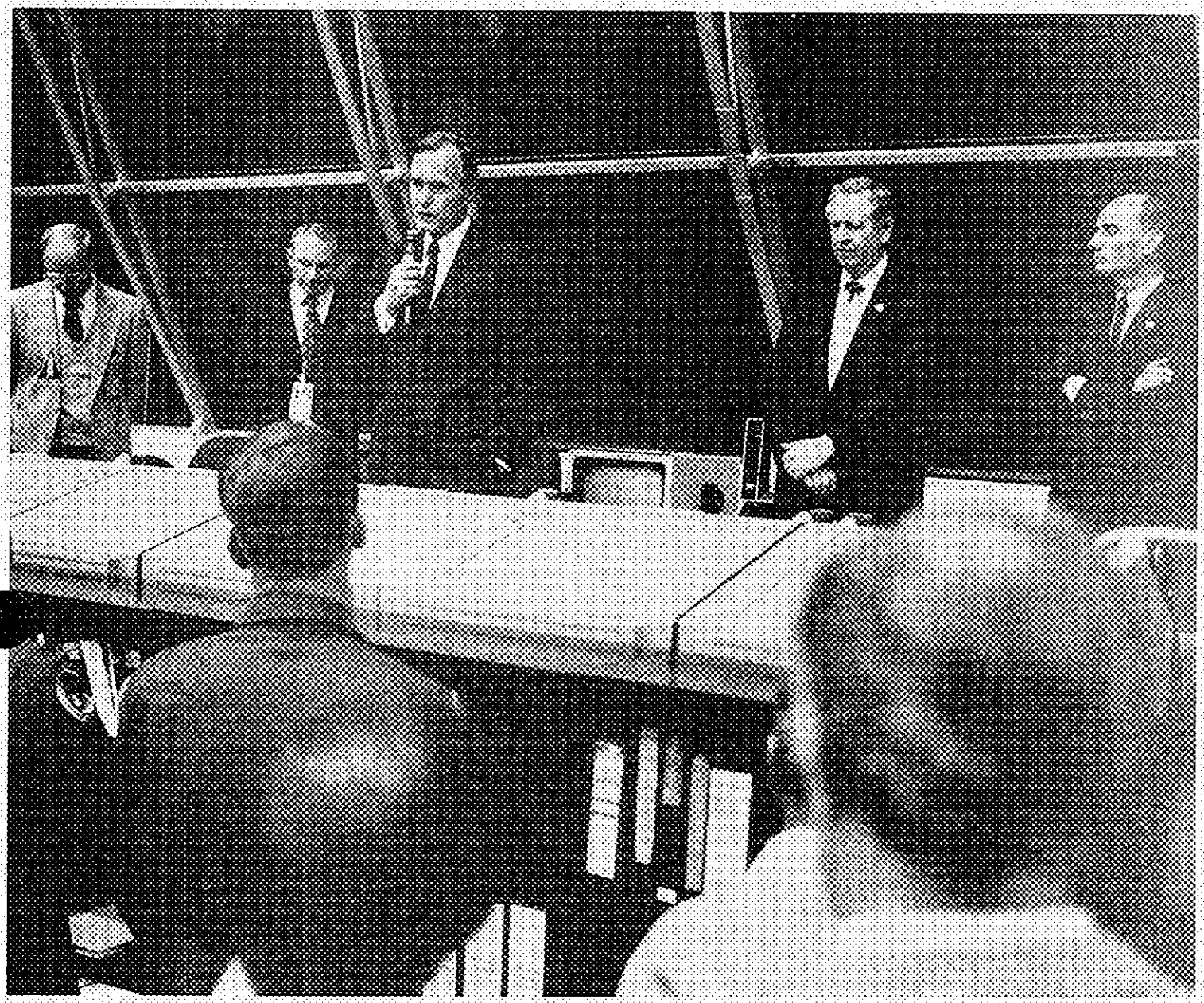


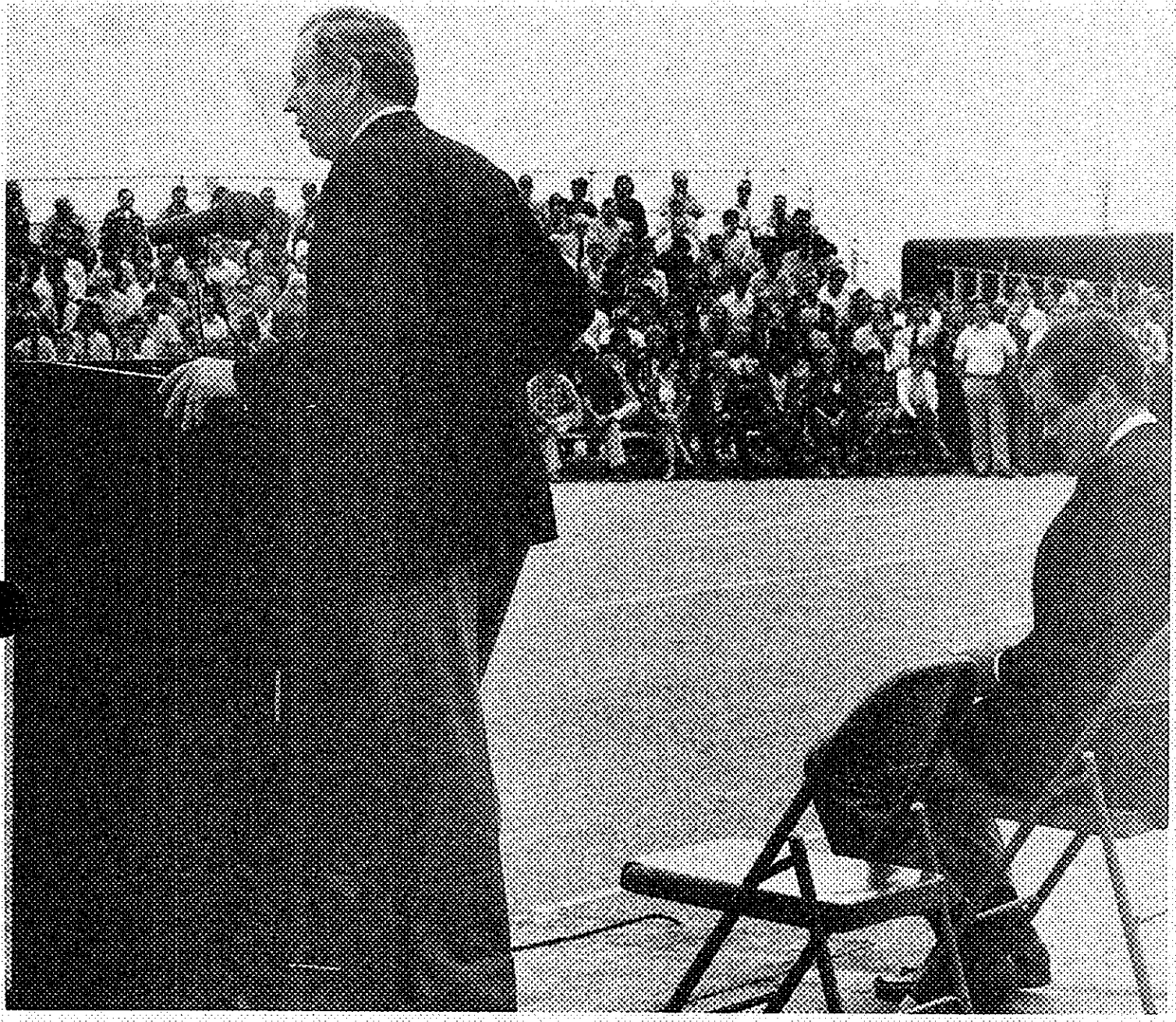
The space shuttle Challenger lifted off from Pad 39B January 28, 1986, at 11:38 a.m. EST carrying a crew of seven astronauts and the Tracking and Data Relay Satellite (TDRS). An accident 73 seconds after launch claimed the lives of the crew and destroyed the vehicle.



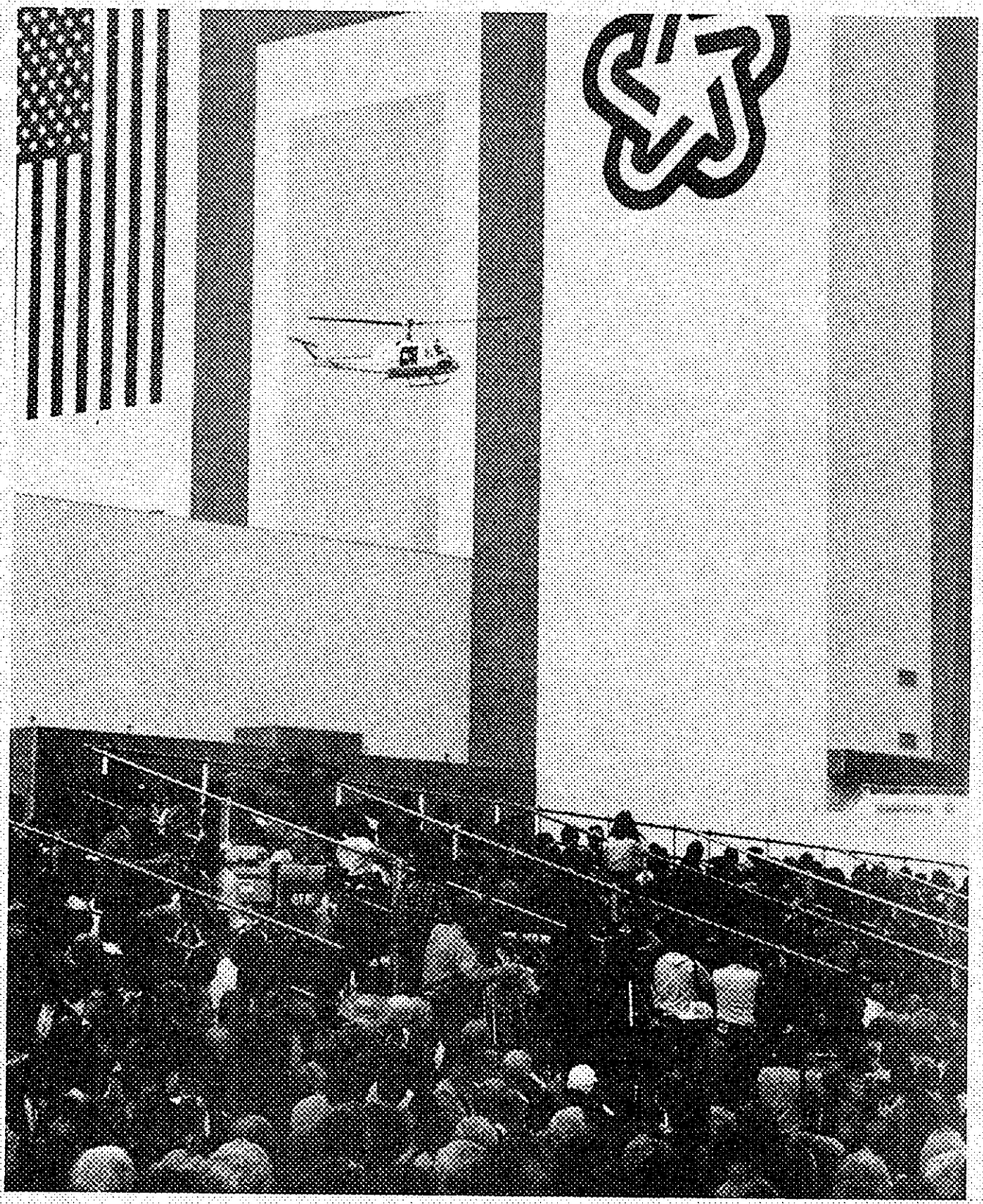
Main engine exhaust, solid rocket booster plume and an enlarging ball of gas from the external tank were visible seconds after the Challenger accident, Jan. 28, 1986.



Vice President George Bush spoke to Kennedy Space Center employees and the nation from Firing Room One of the Launch Control Center, just hours after the Challenger accident. To the right of Bush are KSC Director Richard Smith and U.S. Senator Jake Garn (R-Utah).

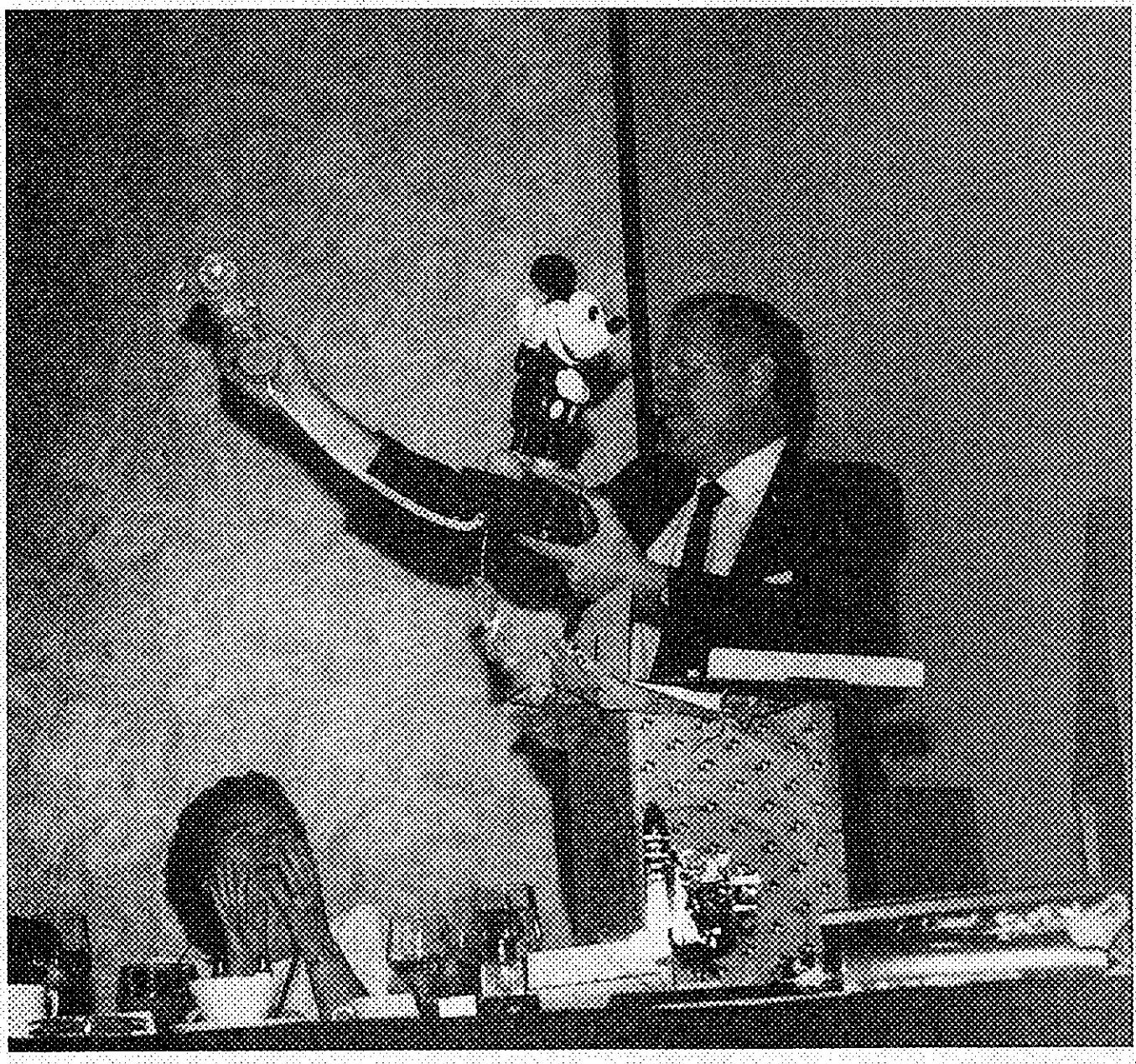


Kennedy Space Center Director Richard Smith spoke to space center employees Feb. 1 at the memorial service for the seven astronauts who lost their lives on Challenger's 51-L mission. On the platform with Smith is U.S. Rep. Bill Nelson (D-Melb., FL).

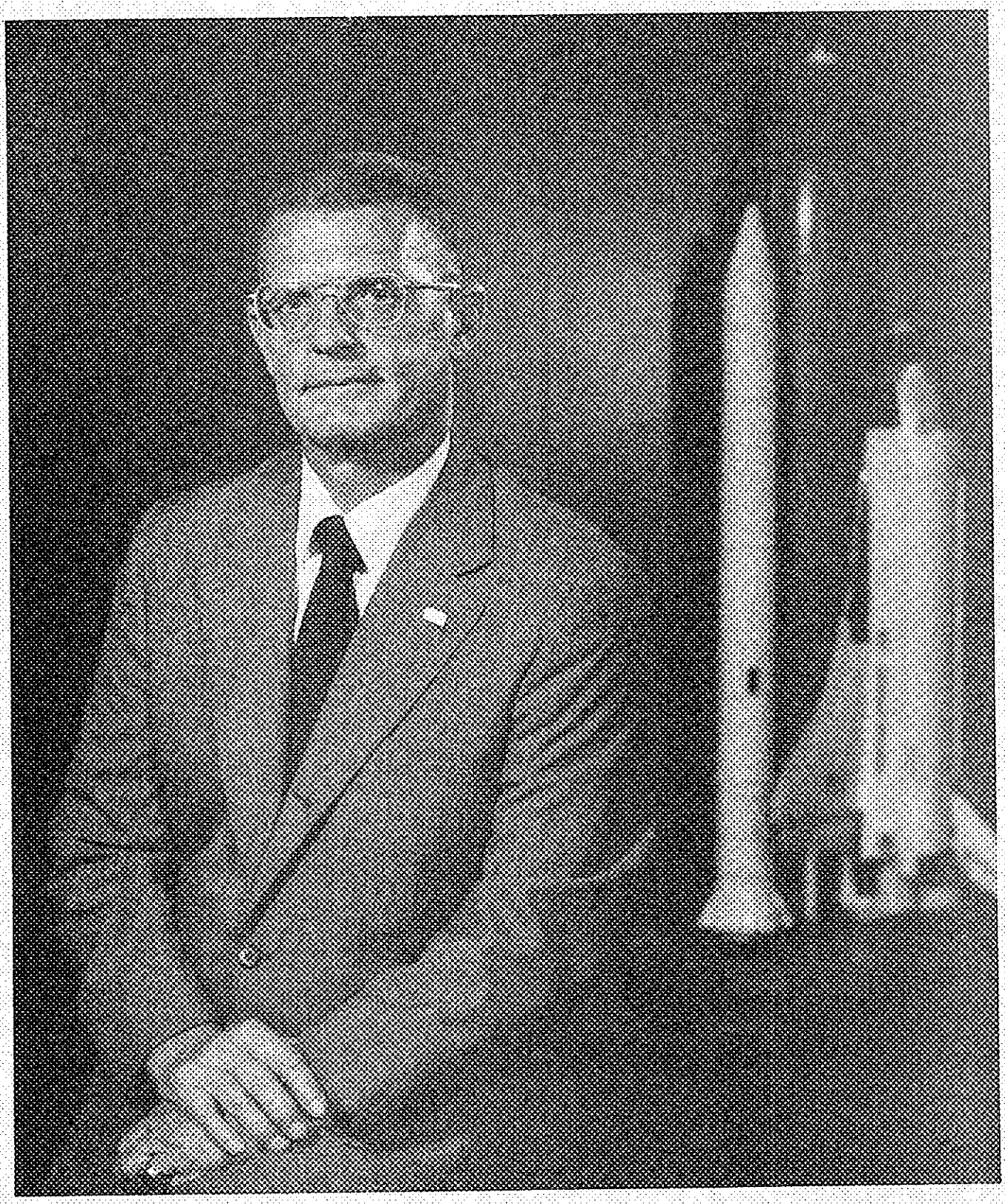


A NASA helicopter carrying the two wreaths lifts off from the VAB and heads out to sea at the close of the Challenger memorial service, Feb. 1, 1986.

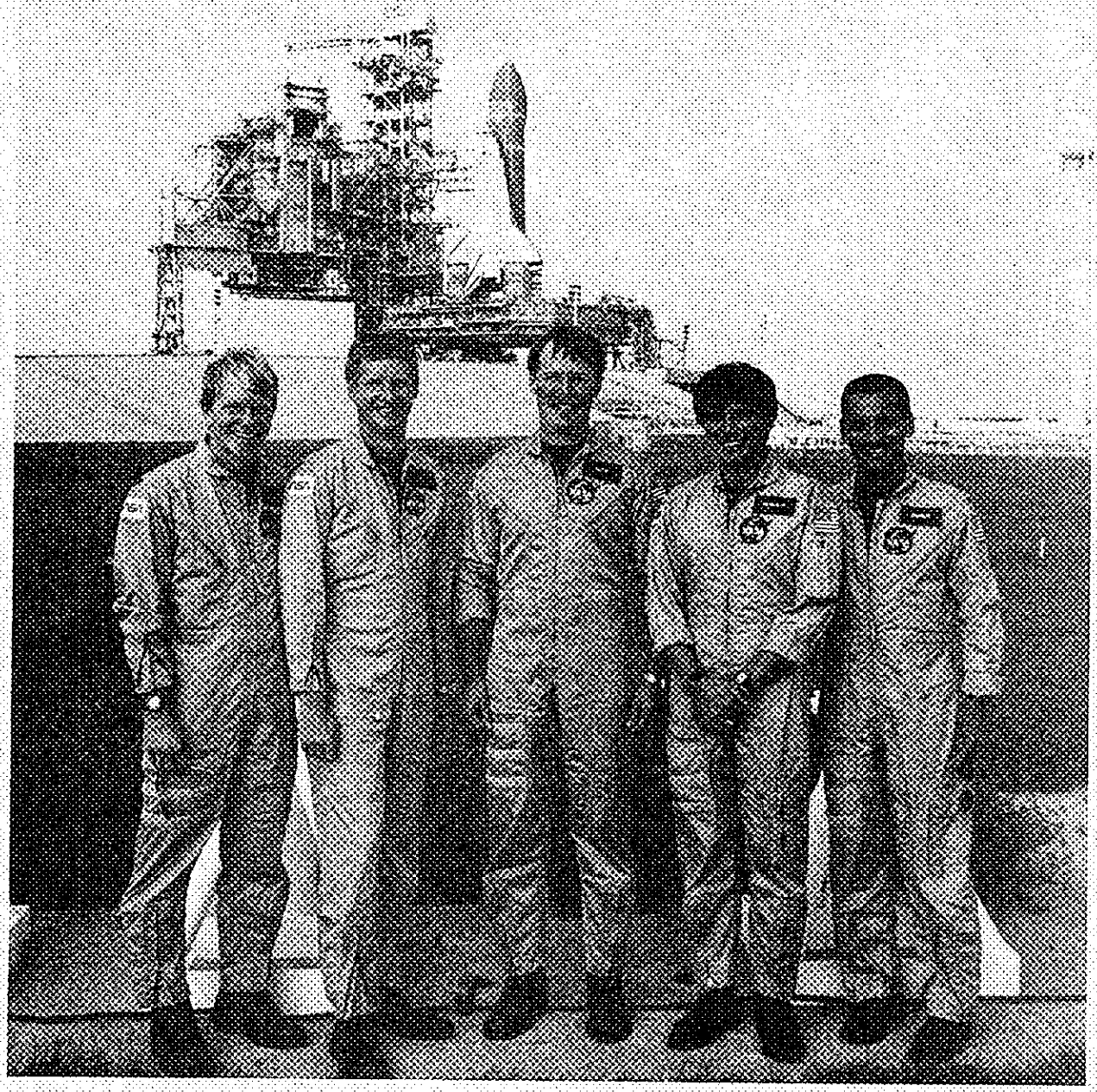
William Rogers, chairman of the presidential commission on the Challenger accident, vice-chairman Neil Armstrong and astronaut Robert Crippen tour Kennedy Space Center, Feb. 14, 1986, as part of the commission's investigation.



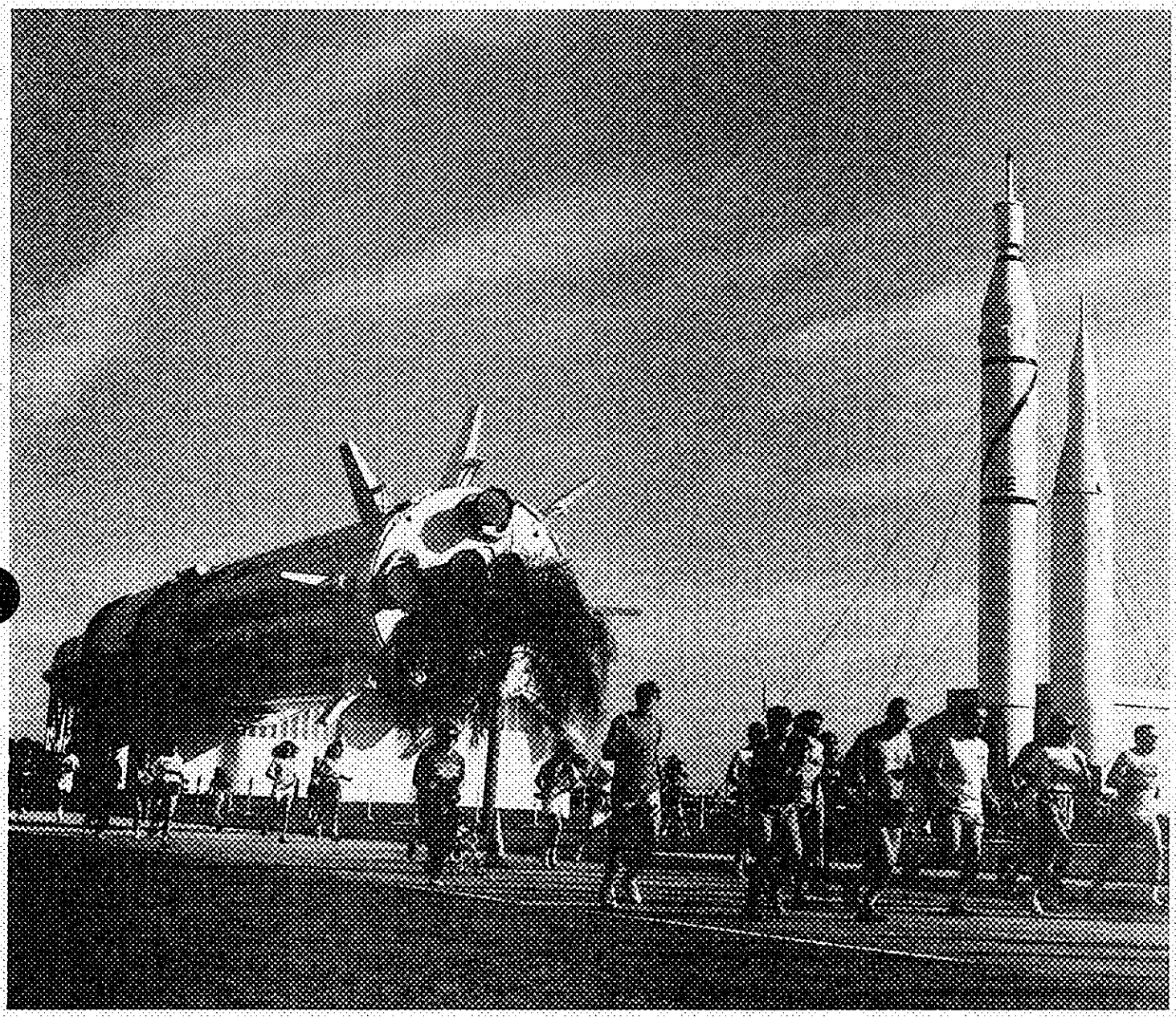
Richard Smith displays a gift just received on the occasion of his retirement as Kennedy Space Center Director, Aug. 1, 1986.



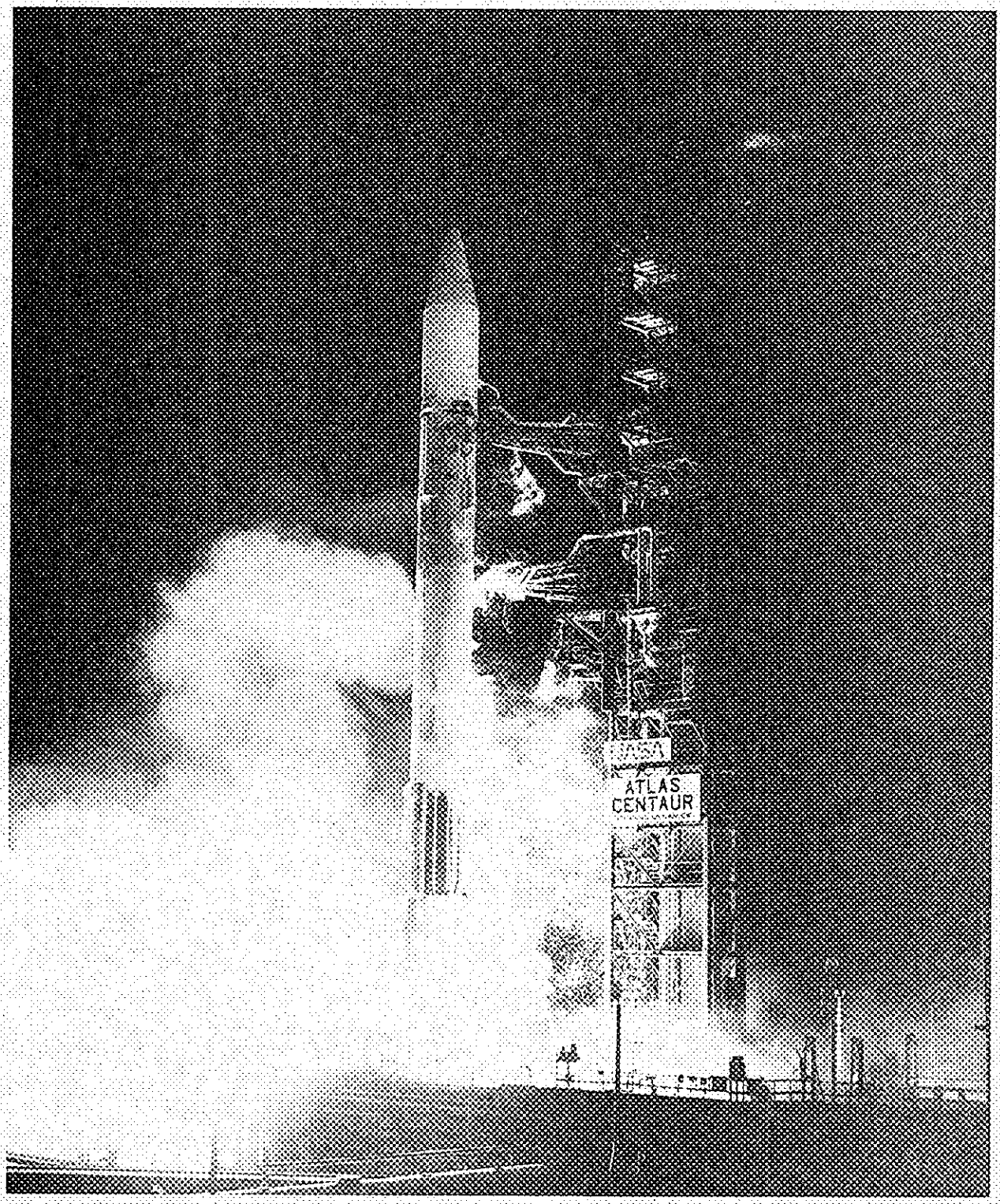
Lt. Gen. Forrest S. McCartney was installed as Kennedy Space Center's fourth director, Oct. 1, 1986.



The crew of shuttle mission 61-C at pad 39B after finishing the countdown demonstration test, Nov. 18, 1986.



Spaceport USA was the starting point Nov. 22, 1986, for the K7 Run which helped raise funds for the Challenger Memorial to be erected at Kennedy Space Center.



Atlas Centaur 66, carrying the FltSatCom F7 communications satellite, was launched Dec. 4, 1986, at 9:30 p.m. EST from the Cape Canaveral Air Force Station.

Kennedy Space Center hosted ten teen-age members of the Soviet Union's Young Cosmonauts organization on Dec. 12, 1986.

January

January 2: Attendance at Kennedy Space Center's Spaceport USA broke several records over the Christmas holidays, according to H. B. Chambers, the facility's general manager. Between Dec. 23 and 31, more than 95,000 people toured the Spaceport - marking the first time it has had five straight days of more than 12,000 visitors daily, Chambers said.

"Not only was our parking lot full, but we also had to resort to parking along the NASA Parkway and run a shuttle service to Spaceport USA," he added. The tourist attraction - Florida's fourth most popular - also enjoyed its best New Year's Day since starting operation in 1966, with 8,916 visitors showing up..., Chambers said. For 1985, the facility had 1,795,857 visitors - a 1.4 percent increase over 1984's total. ["Spaceport Tours Soar Over Holidays," Florida Today, p. 14C, Jan. 3, 1986.]

<> Preparations for January's two shuttle launches picked up at the end of a weeklong holiday lull at Kennedy Space Center, NASA officials said. "Things are really in high gear," KSC spokesman George Diller said. "I don't see any problems here on the status report. We've got all the launch preparations going according to the schedule we outlined before Christmas."

NASA engineers used the holiday break to pinpoint the cause of Columbia's aborted Dec. 19 liftoff, canceled 14 seconds from launch when a booster rocket's "power steering" unit failed. A "black box" of electronics has been blamed for the shutdown, Diller said. Replacement parts have been installed and successfully tested since the shutdown. "I think everybody has got their adrenalin going after coming back from the peace and solitude of the holidays to the fervor of a launch coming up...," Diller said. [Lunner. Florida Today, p. 1A, Jan. 3, 1986.]

<> Brevard Community College student Debra Caroli (Melbourne, FL), was selected for the first annual USBI Booster Production Co. Engineering Scholarship, an award worth $500. [Williams. Florida Today, p. 5A, Jan. 3, 1986.]

January 3: "They keep telling us if we keep practicing this thing, we'll do it right," Cmdr. Robert Gibson said during brief statements made after the crew of Columbia's 61-C mission arrived shortly before 5 p.m. at KSC's landing strip. "We're looking forward, rather than being the last flight of 1985, to being the first flight of 1986," Gibson said. The only other crew member to speak upon arrival was U.S. Rep. Bill Nelson (D-Mel., FL), who remarked, "We're ready to go." He joked that he and the other crew members had a "great time over New Year's being in quarantine and sitting with each other." [Lafferty. Florida Today, p. 1A, Jan. 4, 1986.]

<> Local union leaders said a recent layoff of Kennedy Space Center guards was prompted by a Dept. of Labor ruling entitling the guards to back pay from their employer, EG&G of Florida Inc. The layoff was effective Jan. 1, although about six of those guards have been held over until the Jan. 6 launch of the Columbia, said both union and company officials.

Denver Poore, president of Local 128 of United Plant Guard Workers of America, said a ruling by the Dept. of Labor in late 1985 entitled about 200 guards to back pay for time they put in picking up weapons before their shifts started. James Walton, industrial relations director for EG&G, denied the layoffs were triggered by the back pay ruling. "The two are completely unrelated," he said. EG&G officials blamed budget cuts for the layoffs.

Poore also said EG&G recently eliminated compensation for guards who were paid for time spent riding in government vehicles back to where they parked their own vehicles. Guards now drive their own vehicles to their posts, he said. Walton defended the new policy. "It is what is asked of you and I and everybody else - that you report to where you work." [Johnson. Florida Today, p. 4A, Jan. 4, 1986.]

January 6: A balky fuel valve in the shuttle's engine compartment led to the second scrubbing of Columbia's five-day mission, STS 61-C. "That is a no-go," launch commentator Jim Ball announced about three minutes before the 7:05 a.m. liftoff. Launch managers scrambled to repair the damaged fuel valve, but, 90 minutes later, Ball reported the decision to cancel. "We were just up against a deadline we could not meet," he said. NASA planned to try again Jan. 7, though

weather conditions were expected to deteriorate overnight.

The final decision to postpone came after RCA, NASA's sole satellite customer aboard this flight, determined the safety of its $50 million television relay spacecraft might be jeopardized by a later deployment. RCA paid NASA $14.2 million to launch the satellite. [Lunner. Florida Today, p. 1A, Jan. 7, 1986. See also: Halvorson and Kelley. Florida Today, pp. 1A & 2A, Au. 6, 1986.]

<> International Space Corp. (Melbourne, FL) signed a joint endeavor agreement with NASA to fly a commercial materials processing furnace on six to eight space shuttle missions. The agreement will enable the company to fly up to eight space shuttle flights of the furnace at little or no space transportation cost in order to perfect the proposed directional solidification crystal growth process. The company would have to pay for follow-on flights from which the materials produced could be marketed commercially. International Space Corp. will also make the system available for NASA research. ["Company to Orbit Materials Processing Device," Aviation Week & Space Technology, p. 57, Jan. 6, 1986.]

<> An orientation trip sponsored by the U.S. government brought Lt. Gen. Sven-Olof Olson, the commander-in-chief of the Royal Swedish Air Force, to Brevard County this week to view the attempted launch of Columbia on its 61-C mission. Olson, his wife Yvonne, and his party are visiting this week as guests of Gen. Charles Gabriel, chief of staff for the U.S. Air Force, said Patrick Air Force Base spokesman Col. Bob Nicholson. [Williams. Florida Today, p. 4A, Jan. 7, 1986.]

January 7: Columbia remained on its launch pad after NASA's third attempt to launch its 61-C mission fell victim to the rain in Spain and drifting Sahara winds in Senegal. NASA, which estimates costs of nearly a million dollars due to the delays, plans to try again Jan. 9 at 7:05 a.m. "We're disappointed," NASA shuttle chief Jesse Moore told reporters, but he repeated the agency's commitment to safety first. [Lunner. Florida Today, p. 1A, Jan. 8, 1986.]

January 7: Columbia's failure to begin its mission (61- C) left NASA short of room to house the two shuttle crews and forced the agency to send Columbia's crew back to Johnson Space Center. Columbia's launch has been rescheduled for Jan. 9, but the weather remains a question. Challenger's seven-member crew, which includes "teachernaut" Christa McAuliffe (Concord, N.H.), remained at KSC astronaut quarters to participate in a test countdown that began at 8:40 p.m. and was to end at 11 a.m., Jan. 8. The practice countdown was to begin after the Jan. 6 launch but was canceled when mechanical glitches kept Columbia grounded, said NASA spokesman George Diller.

"I'm not prepared to say there is a (delay) at all," said Jesse Moore, NASA associate administrator for spaceflight. A delay of "a day or two" is possible, he said. In addition to the launch of Challenger, NASA also has some stringent timetables on three other launches through May.

When Columbia returns from its current mission, it will require almost a month of work at KSC before it can be rolled out to Complex 39-B for a scheduled March 6 launch. Another six days will be tacked on if Columbia's current mission lands in California rather than KSC. Bob Sieck, KSC shuttle chief, said Columbia needs to be launched by Jan. 13 to stay on schedule for the March flight. Even if Columbia is launched Jan. 9, he said, the schedule "would be very tight."

NASA is also moving closer to almost back-to-back shuttle launches in May of planetary and solar probes. Because a powerful upper stage never before used for shuttle payloads will propel the probes, intense testing at the launch pads will be required, Diller said. "Certainly every added delay will add some risk to the schedule," Moore said, noting that Columbia's delays are "a couple of days we'd like to have in the bank right now." [Lafferty. Florida Today, p. 6A, Jan. 8, 1986.]

January 8: NASA's next attempt to launch Columbia's 61-C mission will come no earlier than 6:55 a.m., Jan. 10, and perhaps as late as Jan. 12. Meanwhile, KSC technicians worked to repair the latest balky fuel system valve. "The weather forecast has not changed," said KSC spokesman Jim Ball, "but weather forecasting is not an exact science, so we're going to go ahead."

The decision was later changed, and a Jan. 10 launch was scheduled after the valve problem was discovered.

The valve that shut down launch preparations was part of a system that feeds liquid oxygen to the main engines and is supposed to close when Columbia's engines shut down, about nine minutes into the launch. Main engine experts at Marshall Space Flight Center said if the valve didn't close, the engine turbopumps could be damaged. [Lunner. Florida Today, pp. 1A & 2A, Jan. 9, 1986.]

<> Challenger's 51-L crew spent the day practicing a dress-rehearsal countdown for their own mission. Most of Columbia's 61-C crew remained in Houston; U.S. Rep. Bill Nelson (D-Melbourne, FL) and Robert Center of RCA stayed at KSC. Teacher Christa McAuliffe and her colleagues were philosophical about the delays in Columbia's launch. "It's an inconvenience," she remarked, "but it's part of the system." Challenger's commander Dick Scobee said of Columbia's delays, "It's a very complicated system. Nature got us one day; the orbiter got us the next. There's not a whole lot we can do about it. We're still going for the 23rd."

The Challenger crew, wearing yellow rain slickers over their blue astronaut jump suits, took time out for a photo session after inspecting the slide-wire emergency exit system and taking turns driving the converted armored personnel carrier they'd use to escape in an emergency at the pad. McAuliffe, who got a bag of apples as a gift from a radio reporter, said she's still in awe of her opportunity. "It still doesn't seem real that I'm going to be able to go with these guys," she said, adding that she feels sorry for the Columbia crew that has thus far spent nine hours strapped into flight seats that haven't left Earth. "It's hard," she said of the waiting. "I feel a lot of empathy for the crew that's already been there three times. My back would hurt!" [Lunner. Florida Today, pp. 1A & 2A, Jan. 9, 1986.]

January 10: The crew of the 61-C mission climbed aboard Columbia for the fourth time in hopes of a liftoff at 6:55 a.m., despite accurate forecasts of thunderstorms in the area. The earliest liftoff time passed as the launch team waited for the weather to improve. The launch was scrubbed just before 9 a.m. EST. The most recent mechanical delay was blamed on a pencil-sized

temperature sensor that broke loose and traveled down a main engine oxygen supply line. The metal device lodged in a valve that stuck open, leading technicians to believe an electrical problem had developed. If NASA had launched with the valve open, serious engine damage could have resulted as Columbia reached its orbit altitude. [Lunner. Florida Today, p. 1A, Jan. 11, 1986.]

January 11: Twenty area residents, most of them NASA or contractor employees, gave blood to be used in an experiment aboard Columbia's 61-C mission. The donations were the fourth in a series of donations for launches eventually scrubbed, said Dr. May Jacobson of Children's Hospital in Boston. The experiment will allow scientists to measure the effect of sedimentation, or sinking caused by gravity, on blood cells on Earth by comparing them with the blood cells in the microgravity of space, said Dr. Douglas Surgenor, president of the Center for Blood Research, and principal investigator for the shuttle project.

"I think the basic objective is to try to improve the ability to store blood cells or blood back on Earth," said Surgenor. The repeated donations are necessary because the blood is usable only for a limited amount of time, added Dr. Jacobson. The day before the scheduled launch, some of the blood is separated into red blood cells, white blood cells and platelets, while the remainder is left whole, she said. The white blood cells and the platelets can be used only for seven days - two scheduled launch dates and the following five days of the mission, Jacobson said. [Johnson. Florida Today, p. 7A, Jan. 12, 1986.]

<> Kennedy Space Center officials said there were no evident problems with Columbia's hardware and that the weather forecast was good for the shuttle's Jan. 12 launch, its eighth attempt. "I just called over there to the Firing Room," spokesman Jim Mizell said in the afternoon. "They said they're ready to go - again." [Lunner. Florida Today, p. 1A, Jan. 12, 1986.]

<> NASA is installing fiber optic transmitters and receivers within its video communications system at Kennedy Space Center to link various facilities. Remote camera sites, central monitoring facilities and main buildings will be tied together by the proposed

system. PlessCor Optronics is the supplier for the $650,000 project. ["Hotline," Florida Today, p. 1F, Jan. 12, 1986.]

January 12: The space shuttle Columbia finally left its launch pad 26 days, seven delays and $1.5 million late. "Panemonium broke out in the Firing Room," NASA spokesman and launch commentator Jim Ball reported. "There was an outburst of applause like I have never heard. They were all glad to see Columbia (STS 61-C) leaving town." Liftoff was on time at 6:55 a.m. under clear skies at sunrise. The shuttle is scheduled to return to Kennedy Space Center at 7:09 the morning of Jan. 17. [Lunner. Florida Today, p. 1A, Jan. 13, 1986.]

January 13: Shuttle flight director Jay Greene told reporters at a briefing at Johnson Space Center that cutting a day off the mission of Columbia (61-C), now scheduled to land at 7:12 a.m. at Kennedy Space Center, was being considered. "Obviously, we're tight on the next two flights," he said. NASA is planning a Jan. 24 mission (51-L) that includes teacher-in-space Christa McAuliffe. Mission 61-E was scheduled to launch March 6 and will use NASA's Astro-1 celestial device to make detailed observations of Halley's Comet. [Lunner. Florida Today, pp. 1A & 2A, Jan. 14, 1986.]

<> Michelle Tremante, Jim Hazleton and Dave Henson were honored by their employer, Lockheed Space Operations Co., as outstanding employees for 1985. [Lunner. Florida Today, p. 5A, Jan. 14, 1986.]

January 14: Banking on the continued growth of the U. S. space program Vector Land Group (Coral Gables, FL) is planning to develop an $80 million to $100 million corporate and residential project just outside Kennedy Space Center aimed at attracting aerospace business, an official with the firm said. Called Vector Space, the project envisions developing 164 acres on the southeast corner of U.S. 1 and SR 405, according to Edward Tables, the company's vice president. "Frankly, we're betting on the ongoing success of the space program," Tables said. [Perez. Florida Today, p. 1A, Jan. 15, 1986.]

<> NASA managers opted to shorten the planned five-day flight of Columbia's 61-C mission to reduce the pressure on Kennedy Space Center processing teams who must refurbish the orbiter for a March 6 launch, and to

avoid deteriorating weather at KSC. The landing was set for 8:28 a.m., Jan. 16. [Lunner. Florida Today, p. 1A, Jan. 15, 1986, and "NASA to Bring Columbia Back One Day Early," Defense Daily, p. 76, Jan. 15, 1986.]

January 16: Columbia, continuing the bad luck which has plagued its 61-C mission, was forced to stay in space an extra day after low clouds and fog shrouded the Kennedy Space Center runway. Landing was reset for 7:12 a.m, Jan. 17, however, weather conditions were expected to be only slightly better than those today. Rain was expected in the space center area on the 18th, and mission planners did not want to keep Columbia in orbit longer than that, said flight director Gary Coen. [Fisher. The Orlando Sentinel, pp. A-1 & A-9, Jan. 17, 1986.]

<> The shuttle Centaur upper stage successfully passed one of its final major tests, NASA announced. The upper stage is needed to send two probes to Jupiter and the sun. Its test success eases the concern that the engine won't be ready in time to meet a May launch deadline for the Galileo and Ulysses science missions. Problems with the fuel valve and other problems have delayed final preparation of the engines, and the rest of the testing and pre-launch processing schedule is very tight, space officials said. [Fisher. The Orlando Sentinel, p. A-9, Jan. 17, 1986.]

January 18: Columbia's six-day, delay-prone 61-C mission finally came to an end at 8:59 a.m. at Edwards Air Force Base, California. Shuttle chief Jesse Moore reported that "the landing was a very, very smooth landing. Columbia has performed magnificently on this mission." Space Coast congressman Bill Nelson (D-Melbourne, FL) said, "NASA wanted me to learn a lot about NASA. I didn't realize that I was going to have all the experience that I've had, of four tries to get up and three tries to get down." [Lunner. Florida Today, p. 1A, Jan. 19, 1986.]

January 19: At least 145 workers have been flown from Kennedy Space Center to Edwards Air Force Base, California, to inspect and prepare Columbia for its trip home. Meanwhile, at KSC, plans moved ahead for Challenger's planned Jan. 25 launch of 51-L, which will carry teacher Christa McAuliffe on a six-day flight. [Mittman. Florida Today, p. 1A, Jan. 20, 1986.]

January 20: Lockheed Space Operations Co. (Titusville, FL) has been named NASA Kennedy Space Center's Large Business Contractor of the Year for 1985. The award recognized the company's efforts to award subcontracts to small businesses. "Our goal was to award 30 percent of the funds available for subcontractors to small businesses," Lockheed Small Business Administrator Russ King said. "We exceeded that amount, awarding 40 percent to firms in that category."

Other firms recognized by NASA were Ebon Research Systems (Cocoa, FL) named both Small Prime Contractor of the Year and Woman-Owned Business Contractor of the Year; David Boland Inc. (Titusville, FL), Small Business Subcontractor of the Year; and Santa Cruz Construction (Merritt Island, FL), which was chosen Small Business Minority Contractor of the Year. ["Lockheed Earns Award for Aiding Businesses," Florida Today, p. 14C, Jan. 21, 1986.]

<> Preparations to ferry Columbia from California to Kennedy Space Center are proceeding smoothly and the first operational shuttle should begin its return trip Jan. 22, said NASA spokesman Dick Young. Technicians at Edwards Air Force Base, CA, appear to be "gaining on the schedule and should have everything ready by then, though strong winds in California are proving somewhat of a hindrance," he said.

"It appears to be our cleanest (flight) yet on the tiles," Young said. "They (the technicians) generally are very pleased with the shape of Columbia."

Temperature sensors taken off Columbia's main engines were flown aboard a T-38 to KSC on the 19th to be installed aboard Challenger, which is scheduled for launch on the 25th, Young said. Workers at KSC continued to prepare Challenger for its mission. If Columbia is brought back from California to KSC by the 23rd, and NASA makes its projected 41-day processing schedule, the shuttle will be ready March 4 for its scheduled March 6 flight, STS 61-E. It will mark the 26th shuttle launch. [Lafferty. Florida Today, p. 3A, Jan. 21, 1986.]

<> USBI Booster Production Co. Inc. (Titusville, FL) has fired 50 of its 750 workers. In an official statement, the company said, "The reduction was made to

bring the employment level in line with current and future work loads." Despite the fact that the shuttle program has just entered its busiest year, with 15 launches planned in 1986, the company refused to elaborate on its reasons for the permanent layoffs. Spokeswoman Kathleen Mason said the employees, who were let go Jan. 17, represented a cross section of all departments. The company, she said, was helping the workers find new jobs. USBI received a five-year, $274 million contract in 1984 to continue the booster work it had done since 1977. [Hinman. The Orlando Sentinel, p. C-1, Jan. 21, 1986.]

<> A $16 million logistics facility that will house 550 employees and maintain 190,000 shuttle spare parts and systems has been completed near the Vehicle Assembly Building. Completion of the new facility will allow the shuttle program to consolidate the thousands of spare parts that have previously been stored in several warehouses at Kennedy and the adjoining Cape Canaveral Air Force Station.

Advanced retrieval systems including the use of robotic devices to remove parts from their storage areas and then take them to a point for human pickup is included in the facility. NASA and Lockheed Space Operations Co. employees began moving into the 324,640-square foot facility last fall. The building was built by a Cleveland, Ohio, construction firm under contract to Lockheed. Construction began in 1984. ["Shuttle Logistics Facility," Aviation Week & Space Technology, p. 111, Jan. 20, 1986.]

January 21: Poor weather conditions at an alternate shuttle landing site prompted plans for a possible delay of the Jan. 25 launch of Challenger (STS 51-L), NASA officials said. NASA currently plans to launch Challenger and the first teacher-in-space at 4:21 p.m. on the 25th from the recently reactivated Launch Complex 39B. Unless a haze hanging over the alternate landing site at Dakar, Senegal, clears, Challenger's launch may be delayed until Jan. 26, said NASA spokeswoman Lisa Malone. [Lafferty. Florida Today, p. 4A, Jan. 22, 1986.]

<> Volatile fuel used to maneuver in-orbit shuttles burned a Lockheed technician who was inspecting fuel storage areas near a Kennedy Space Center launch pad, officials said. Philip Hudgins, 26, received

second-degree burns to his left forearm and first-degree burns to his face about 8:15 a.m. when he was sprayed by gaseous and liquid forms of hydrazine fuel, according to NASA. The Merritt Island man was reported in good condition at Jess Parrish Memorial Hospital (Titusville, FL). Hudgins, who was working with three Grumman Technical Services employees, was removing a temperature probe from a fuel line near the base of Launch Complex 39A when the accident occurred, Lockheed Space Operations spokesman Stuart Shadbolt said. Shadbolt also said that Lockheed is conducting an investigation into the accident.

Following the accident, Hudgins was taken to a shower at the pad and sprayed with water to wash away the fuel. He was then taken in an ambulance to a KSC clinic where he was treated, NASA officials said. The fuel did not appear to damage Hudgins's eyes, but slightly burned his left eyelid, a hospital spokeswoman said. NASA spokesman Dick Young said he could not recall a similar accident at KSC. [Lafferty. Florida Today, p. 3A, Jan. 22, 1986.]

<> "Home is home and there's no place like home," said globe-rounding congressman Bill Nelson (D-Melbourne, FL) on returning home after six days in space aboard the space shuttle Columbia's STS 61-C mission. "I just wish we had come in at 7:14 a.m. Thursday [Jan. 16]," he said. Poor weather at Kennedy Space Center forced a Jan. 18 landing at Edwards Air Force Base in California.

The re-entry and landing were "incredibly benign except for an orange glow outside the window," the three-term Florida Democrat said. He said the long weeks of training paid off with "six glorious days in space. My memory is of looking out the windows and seeing one-third of the entire Earth and how fragile is the planet we have suspended in the black void of space. It shows just how important it is for all of us to come together in peace," Nelson said.

Nelson's training for the ride forced him to be away from Washington for days at a time, but an aide said Nelson kept in contact with his office. "He received summaries of what was going on in the office and had countless phone calls with staff," the aide said. The congressman also tried to return to Washington as often as possible during the training, the aide added. [Haj. Florida Today, p. 3A, Jan. 22, 1986.]

January 22: A Lockheed employee burned with fuel used to power the shuttle was in "excellent" condition at Jess Parrish Memorial Hospital (Titusville, FL), a hospital spokeswoman said. Hospital officials did not know, however, when the employee - Philip Hudgins, 26, (Merritt Island, FL) - would be released. ["Burned Worker Recovers at Hospital," Florida Today, p. 3A, Jan. 23, 1986.]

<> Dust from the Sahara and an approaching cold front prompted a one-day delay in the launch of Challenger's 51-L mission, NASA officials said. Challenger's liftoff is now scheduled to occur at 9:36 a.m., Jan. 26, rather than Jan. 25 at 4:21 p.m., said NASA spokesman Dick Young. NASA's secondary emergency landing site in Spain can't be used because Challenger, loaded with a full crew and a 2 1/2-ton tracking and data relay satellite, is too heavy to go that far north after launch, said NASA spokesman George Diller. That leaves the Mohammed V Airport at Casablanca, Morocco, as the next available landing site, Diller said. That site, however, is not certified for night shuttle landings, which would be the case if Challenger were launched in the afternoon. The Jan. 26 morning launch would enable a daylight landing.

In addition to the landing site problem, weather forecasters are predicting a cold front will move through the Space Coast on the 25th. While the cold -forecast to bring rain - is expected to persist through the weekend, the forecast is better on Sunday [26th] than Saturday [25th]. The launch delay caused a subsequent delay in the arrival of Challenger's crew at KSC; the seven crew members are now expected to arrive at 4 p.m., six hours after the flight's countdown began at 10:00. Columbia is also expected to arrive at 1:35 p.m., Jan. 23. [Lafferty. Florida Today, p. 1A, Jan. 23, 1986.]

<> Christa McAuliffe, upon arrival at Kennedy Space Center told an unusually large gathering of journalists that: "I don't think any teacher has ever been more ready to have two lessons in my life." She referred to the two televised classes she is scheduled to conduct from space, beginning with day four of the STS 51-L mission.

As for the reporter turnout, NASA spokeswoman Sarah Keegan said, "There's more media here than we've had for quite awhile." About 800 reporters - nearly twice the recent average - signed up to cover the launch on Jan. 26, sometime between 9:36 a.m. and 12:36 p.m. Many of the reporters are from New England newspapers and broadcast outlets which seldom express interest in NASA activities. McAuliffe was born in Boston and teaches high school in Concord, N.H.

The crew is commanded by NASA astronaut Dick Scobee, with Navy Cmdr. Michael Smith as pilot. Mission specialists are Judy Resnik, Ronald McNair and Ellison Onizuka. Hughes engineer Greg Jarvis is the second payload specialist. [Lunner. Florida Today, pp. 1A & 2A, Jan. 24, 1986.]

<> Jesse Moore, the head of NASA's space shuttle program, was named as the new head of Johnson Space Center, home of Mission Control. Moore, who has headed the shuttle program since April 1984, will continue in that capacity and direct JSC operations until May. He replaced former KSC deputy director and JSC director Gerald Griffin, who resigned to become president of the Houston Area Chamber of Commerce. [Lunner. Florida Today, p. 6A, Jan. 24, 1986.]

January 24: "Preparations are under way here at the center," NASA spokesman Jim Mizell said of the efforts being made to accommodate the announced visit of Vice President George Bush to KSC to view the liftoff of STS 51-L. "We've contacted our roads and grounds people to spruce up the area and make it look better for his arrival." Mizell said he expects national press corps to accompany Bush from Washington, D.C., in addition to the media on hand to cover the flight of teacher Christa McAuliffe (Concord, N.H.). NASA received notice at 5 p.m. that Bush would be present at the 9:36 a.m. Jan. 27 launch and would spend the night of Jan. 26 in Brevard County, but Bush's itinerary was not announced in detail, Mizell said. [Cacdac. Florida Today, p. 3A, Jan. 25, 1986.]

<> Rep. Bill Nelson (D-Melbourne, FL) was interviewed last week by The Orlando Sentinel on his return from six days aboard the space shuttle Columbia. He was asked: "What did you get out of your shuttle trip?"

Nelson: "Having crawled into a loaded spaceship four times and then having been waved off three times, having gone through two months of training and one month of preparation before that, and then having had the experience of six days in flight, I now understand America's space team much better. I understand the fantastic flying machine that we have and what our capability is, having been there. I am looking forward to sharing a number of these experiences with my colleagues in Congress as we decide where America's space program is supposed to go."

Sentinel: " NASA has estimated the value of the payload specialist training at about $100,000. What are the taxpayers getting for this, particularly in light of what you missed on the House floor when you were away?"

Nelson: " The value is that I want to be and now can be the best chairman that I can possibly be. Part of being an effective chairman is to have knowledge so that when people from NASA and people from the aerospace industry and people, who have ideas about what America's space program ought to be, come before you and testify, you can evaluate the information they are giving you from a base of information that you have. I have certainly - and very fortunately - been able to acquire that base of information."

Sentinel: " Do you think it is worth it in terms of the cost of the training?"

Nelson: " Undoubtedly, yes." ["Nelson: Shuttle Trip Made Me A Better Congressman," The Orlando Sentinel, p. 1H, Jan. 26, 1986.]

January 25: Among the special guests visiting the Press Site prior to the launch of Challenger on its 51-L mission were eight space scientists from the People's Republic of China. "We wanted them to see how the free press operates," said Jim Phillips, director of facilities and mechanical engineering at KSC. "They're having a great time." Another visitor was retired Gen. Tom Stafford, veteran of flights into space aboard Gemini 6 & 9, Apollo 10 and the Apollo-Soyuz Test Project. The launch of Challenger from Launch Complex 39B is particularly significant to him, Stafford said. "There's only been five launches (from Launch Complex B), and I flew two of them."

Notables expected for the launch were Vice President George Bush, congressional observer "astronauts" Sen. Jake Garn and Rep. Bill Nelson, New Hampshire Gov. John Sununu and columnist Jack Anderson. [Johnson. Florida Today, p. 10A, Jan. 26, 1986.]

January 26: Challenger's launch was scrubbed by a forecast of bad weather. To the consternation of mission managers, they awoke on the 26th to find ideal liftoff conditions, too late to fuel Challenger for takeoff. Frustrated by weather delays in two straight shuttle missions, NASA officials are prepared to spend millions to develop a system of "now-casting," said spokesman George Diller. "We're trying to project a localized forecast. We'll develop some computer models to try and predict weather conditions at specific locations, such as over the pad and the landing strip." Forecast for a Jan. 27 launch at 9:37 a.m. showed temperatures in the mid-30s and scattered clouds - less than perfect, but acceptable conditions. "It looks like we have a pretty good shot at it," Diller said. [Lunner. USA Today, p. 3A, Jan. 27, 1986.]

January 27: "It was just not our day," said shuttle chief Bob Sieck, about the day's delay in launching Challenger. The day's luckless chain of events began as the crew noticed a "door ajar" signal, indicating the shuttle hatch hadn't shut properly. The launch pad crew fixed that problem, but then couldn't budge the hatch's exterior handle, which must be removed before liftoff. As workers struggled with the handle, strong winds whipped into the area, and the liftoff was canceled. Launch was rescheduled for 9:36 a.m., Jan. 28. [Lunner. Florida Today, p. 1A, Jan. 28, 1986.]

January 28: STS 51-L ended one and a half minutes after it began when the second oldest shuttle - Challenger - exploded following its 11:38 a.m. liftoff from Launch Complex 39B. None of the seven crew members survived what NASA described as a "nonsurvivable accident." The crew included: Commander Francis R. "Dick" Scobee, of Washington state; pilot Michael J. Smith, of North Carolina; mission specialists Ellison Onizuka, Hawaii; Ronald McNair, South Carolina and Judith Resnik, Ohio; payload specialist Gregory Jarvis, Detroit, Michigan and Christa McAuliffe, Concord, N.H., designated as America's first teacher in space.

"There has been an explosion," Mission Control announced from Houston, little more than a minute after launch. The launch had appeared to be perfect to that point. NASA managers immediately impounded all evidence concerning the tragic flight, named an investigation board and suspended the shuttle program until the day's events could be understood.

"We will not speculate on the specific cause," Jesse Moore, head of NASA's shuttle program told reporters in a late afternoon news conference. "All of the people involved in this program felt that Challenger was ready to go," Moore said. "All early indicators have [shown] that the launch was normal until about a minute or so into the flight." Moore was asked whether the shuttle may be too complicated a machine upon which to build America's future space efforts. "That question, I'm sure, will be asked," Moore replied. "I don't want to speculate on that at this point in time, but it's certainly a logical question for somebody to ask."

Three times the launch of 51-L had been canceled when weather was unfavorable, either at KSC or at NASA's trans-Atlantic emergency landing sites. Launch came at 11:38 a.m., two hours after the originally scheduled time due to subfreezing conditions that had encrusted the launch pad with icicles. [Lunner. Florida Today, pp. 1A-2A, Jan. 29, 1986.]

<> Vice President George Bush flew to Kennedy Space Center late in the day to visit with family members of the dead shuttle astronauts and confer with NASA officials investigating the tragedy. Bush, accompanied by U. S. Sens. Jake Garn (R-Utah), and John Glenn (D-Ohio), said that the nation's reaction to the death of the seven crew members must be renewed dedication to continuing the space program. "We must be as they were - great in spirit, great in courage and great in dedication to the adventure of which they were so much a part," Bush said. "We must resolve that, like America's pioneers of the past, others will follow, others will explore,

others will risk as these seven great Americans risked today."

Arriving at the KSC landing site at about 5:15 p.m., Bush spent just over two hours meeting with members of the press, talking with the families of the crew members and conferring with NASA officials. The vice president spent about 20 minutes in family quarters at the space center, talking individually with the family of each crew member who perished, according to NASA officials. There were about 25 relatives present. From there, Bush traveled to the KSC Launch Control Center where NASA officials tried to determine what caused Challenger to explode shortly after takeoff.

"The President and I and the entire nation join in mourning these seven spendid men and women who now rest in God's arms," Bush said in a statement. "Today's tragedy reminds us that danger awaits all who push back the frontier of space. It reminds us that the great adventure of space travel requires men and women of spirit and bravery." Bush also offered words of encouragement to the nation's schoolchildren and especially to the children of Concord, N.H. - the home of teacher Christa McAuliffe. "You must try to understand that spirit, bravery and commitment are what make not only the space program but all of life worthwhile," Bush said. "We must never, as people in our daily lives or as a nation, stop exploring, stop hoping, stop discovering. We must press on."

Those views were echoed by Glenn, one of the original seven U. S. astronauts and the first American to orbit the Earth in 1962. "It's been nearly a quarter of a century that we thought this might happen sometime. But we have delayed that day until today," said Glenn - his eyes moist and voice cracking. "We hoped that this day would never come. But, unfortunately, it has, and with a tragedy all Americans share together." The former astronaut said that the country must not forget that no lives have been lost in 56 flights into space with crew aboard. Some relatives of the seven crew members who died had told NASA officials that the accident should not endanger the space program, Glenn said.

Garn said he joined the rest of the country in its sorrow. "It has been a difficult day for me personally because I knew each of them," said Garn. He became the

first politican to fly into space last year. In Washington, U.S. Rep. Bill Nelson (D-Melbourne, FL), who flew on the last mission (STS 61-C), said that the crew of Challenger probably had no clue of the trouble that turned their flight into tragedy. "The crew wouldn't even have known what was coming," Nelson said. NASA training is so thorough, he said, that given the slightest chance, the crew would have kicked in a contingency plan. "When there is an explosion such as occurred today there is no contingency," he said. He said, further, that every crew member would have understood the risk that spaceflight entailed. [Williams. Florida Today, p. 2A, Jan. 29, 1986, and Morgan. Florida Today, p. 5A, Jan. 29, 1986.]

<> Circuits overloaded and long-distance telephone lines to the Kennedy Space Center jammed almost immediately after the shuttle explosion that millions saw on television. The local telephone system was "locked up," according to Southern Bell spokesman Larry Strickler. He said workers had to take direct control over switching equipment in Orlando to handle the problem. [Wark. The Orlando Sentinel, p. A-3, Jan. 29, 1986.]

January 29: Search and rescue teams in eight ships and nine aircraft recovered about 600 pounds of debris from the explosion of Challenger on the 28th. No clothing or personal effects were found among the debris, officials said. A large, cone-shaped object believed to be the nose cover to one of Challenger's solid rocket boosters was spotted. Experts were studying computer readouts that timed events at one-thousandths of a second, hoping to learn if the problem could have been a rupture of the shuttle's external tank which had been the subject of much speculation as the cause of the explosion.

Kennedy Space Center Director Richard Smith revealed that an Air Force range safety officer had destroyed Challenger's twin rockets after they had split from the shuttle's external fuel tank and began to twist and lurch wildly, threatening nearby communities. Coast Guard spokesman Jim Simpson said that search teams are concentrating on recovery of floating material before probing beneath the surface of the 30-to-200-foot waters. [Lunner. Florida Today, pp. 1A & 2A, Jan. 30 1986.]

<> The crowd at Kennedy Space Center's Spaceport USA one day after the Challenger accident was a quiet one, according to George Meguiar, manager of public relations at the attraction. "We had between 1,300 and 1,400 people today, but they came late and left early," he said. Normal operations were to resume at 8 a.m. on Jan. 30, officials said. ["Visitor Center Quiet," Florida Today, p. 4A, Jan. 30, 1986.]

<> Elmer Thomas, 69-year-old NASA engineer, died a day after suffering a heart attack on seeing the Challenger explode. Thomas, (SI-PMO), had been a NASA employee for 17 years. He had watched the Challenger launch from the NASA viewing room. The Titusville resident's wife Pauline said the cause of death was an aneurysm in an artery leading to Thomas's heart. [Lancaster. The Orlando Sentinel, p. A-11, Feb. 1, 1986.]

<> More than 1,800 television, radio and newspaper representatives covered "the hill" at Kennedy Space Center by mid-day in the wake of the Challenger accident. Before the launch, NASA had issued about 500 press credentials for Mission 51-L, 200 more than for recent launches. After the 11:39 p.m. tragedy, NASA issued 541 additional credentals "at almost no notice," said Sarah Keegan, NASA public affairs officer, and another 137 credentials were requested today. Only once before had there been so many reporters on site - in 1981, when 2,700 journalists covered the first launch. [Smith. Florida Today, p. 6A, Jan. 30, 1986.]

<> Alan Bean, Jr., former astronaut, encouraged Kennedy Space Center workers not to lose faith in themselves because of the mid-air explosion of Challenger. "I know there have been some sleepless nights as every single worker goes over and over in his mind everything that led up to the launch, wondering if he did everything he could," said Bean, the fourth man to walk on the moon and the commander of the second Skylab mission.

"But you can't lose faith," he said. "You have to maintain the self-confidence that you did the very best job you could do." Bean said the record of 55 successful human space flights and 24 shuttle launches indicates the quality of the ground crew at KSC. [Williams. Florida Today, p. 8A, Jan. 30, 1986.]

<> One of the two solid rocket boosters that split away after the explosion of Challenger was heading toward a populated area when it was detonated, NASA officials say. Because of the danger to life on the ground, both SRBs were destroyed about 30 seconds after the explosion, NASA public affairs officer Mitch Varnes said. He refused to say where the boosters were heading, saying, "We don't want to pinpoint that area. Actually, only one was heading toward the coastline, but the SRBs are sort of cross-wired where if you destroy one, you have to destroy both." [White. Florida Today, p. 9A, Jan. 30, 1986.]

<> For the second time in less than 15 months, the Air Force has lost its $2.6 million radar balloon known as Fat Albert. For undetermined reasons, the massive balloon broke its 1-inch cable tether at Cape Canaveral Air Force Station Jan. 28; it drifted northeast and eventually sank in the Atlantic said Patrick Air Force Base spokeswoman Dottie Ellington. Technicians tried to recover the balloon by releasing its 255,600 cubic feet of helium to lower it. The Coast Guard vessel Atlantic Century, in the area to search for Challenger debris, intercepted the deflated balloon about 25 miles east of Port Canaveral but was unable to bring it home, Ellington said. [White. Florida Today, p. 10A, Jan. 30, 1986.]

<> NASA officials dismissed any link between a pipe bomb found at Canaveral National Seashore and the explosion of Challenger. A man hunting for debris from Challenger discovered the 8-inch bomb this morning in dunes along the beach. ["NASA Rejects Pipe Bomb Link," The Orlando Sentinel, p. A-20, Jan. 30, 1986.]

<> Canaveral National Seashore Superintendent Art Graham said Playalinda Beach will remain closed for several more days while rangers and NASA workers search for shuttle debris. "Our main concern now is the debris," Graham said. "People often are inclined to take souvenirs." ["Playalinda Beach Closed for Search," The Orlando Sentinel, p. A-20, Jan. 30, 1986.]

<> An elementary school under construction in south Brevard will be named in memory of Christa McAuliffe when it opens next fall, school board officials said. "We want her to be remembered and recognized for years to come," spokeswoman Chevon Baccus said. "What better memorial than a school named after you when you

dedicated your life to teaching?" ["School Named for McAuliffe," The Orlando Sentinel, p. A-20, Jan. 30, 1986.]

January 30: A Coast Guard cutter heading the search for shuttle debris reported finding a large piece of Challenger's fuselage and objects believed to be from its cockpit. The cutter Dallas also reported multiple sonar readings from the nearby ocean floor, indicating other large objects may have fallen in the same area. Debris from the Challenger accident on Jan. 28 has been washing up along the Space Coast for the past two days. All of the evidence was turned over to a special investigating team which included several members of the National Transportation Safety Board - investigators who scrutinize and reconstruct plane crashes.

Coast Guard spokesman James Simpson said 13 ships and 13 aircraft involved in the search had recovered "thousands of pounds" of debris, ranging up to 30-by-5 feet. Some of the objects had wires and gauges attached. More tiles, tubing and styrofoam-like materials also were found, he said. The material was unloaded at a Navy dock at Port Canaveral, normally used for submarines, then stored at an undisclosed location on Cape Canaveral Air Force Station, officials said.

"A NASA recovery vessel is on its way to send divers down to see what they can find," Simpson said. "That's all I really know at this point. I don't have any sizes or depths of water or anything beyond that." [Lunner. Florida Today, pp. 1A & 2A, Jan. 31, 1986.]

<> Overtime for Lockheed Space Operations employees has been slashed while the largest employer at Kennedy Space Center sorts out just what to do following the Challenger accident Jan. 28. Employees were assured that shuttle processing would resume within the next few days, spokesman John Williams said. He said, further, that he did not know specifically what kind of processing would take place, however. NASA suspended shuttle operations following the tragedy. [Lafferty. Florida Today, p. 11A, Jan. 31, 1986.]

<> The intentional destruction of the two solid-fuel rocket boosters on the Challenger probably did not

destroy crucial evidence needed to solve the mystery of the disaster that claimed seven lives, a NASA spokesman said. Two nose cones from the boosters are being recovered and other large pieces are expected to be found, said spokesman Jim Mizell. [Leusner & Fisher. The Orlando Sentinel, p. A-1, Jan. 31, 1986.]

<> NASA officials cautioned their workers against fueling speculation in the media about the cause of the space shuttle crash. "The agency does not wish to further or begin any more rumors," said Charles Redmond, public affairs officer at NASA headquarters in Washington, D.C. "It is absolutely critical that NASA find every bit of information possible and find the real cause of the accident." Widespread speculation could confuse the search for facts and hinder the investigation, said NASA spokesman Michael Lovetto at KSC. Space Center contractors also told employees not to speculate. [Poertner. The Orlando Sentinel, p. A-12, Jan. 31, 1986.]

January 31: NASA sent two seeing-eye robot submarines to the Atlantic Ocean bottom to examine a large object that was thought might be the Challenger crew compartment. The Sprint submersible spent much of the day battling strong currents 20 to 40 miles east of Daytona Beach, training its cameras on the dim wreckage 140 feet down, with inconclusive results.

If the object was the cabin, and if it contained the bodies of the seven crew members, NASA would not say, stressing that the day was dominated by the memorial service in Houston where President Reagan was to deliver a eulogy. "No comment will be made by NASA officials today on anything concerning personal effects or human remains out of respect for the astronauts' families," the agency said. [Glisch. The Orlando Sentinel, pp. A-1 & A-10, Feb. 1, 1986.]

<> About 5,000 people lined Brevard County's beaches just past 8:00 p.m. to cast flashlights and candlelight over the Atlantic Ocean in tribute to the seven astronauts killed in the explosion of Challenger. [Johnson. Florida Today, p. 7A, Feb. 1, 1986.]

<> Several hundred KSC employees and visitors gathered to view the Johnson Space Center memorial service at the Galaxy Theater in Spaceport USA and in the Astronaut

Training Auditorium. The audiences stood to sing "God Bless America," as they watched the wide screens while President and Mrs. Reagan moved to console the dead astronauts' grieving families. "It's heartfelt - and I think that sums it up for everyone here," said David Banks, a NASA property administration officer. "This was a very deep loss." NASA's Clarence Floyd said, "We all work here as a big family, and we all share the same goal - the quest to reach the stars. When something like this happens, you just feel...I feel now almost like my own son has died." [Seglem. Florida Today, p. 7A, Feb. 1, 1986.]

<> Though portions of Kennedy Space Center remain off limits, NASA has given the go-ahead for some work to resume, space agency officials said. None of the work authorized involves Launch Complex 39B and the mobile launch platform from which Challenger and its crew of seven took off on Mission 51-L. In addition, two firing rooms used in the launch also remained impounded except to those involved in the investigation of the accident. Those areas are being checked for clues to the cause of the explosion. NASA is also keeping closed the access road to Playalinda Beach.

At other areas of the space center, workers have begun resuming certain duties, although NASA is not allowing the activation of any power systems on the remaining three orbiters or any modifications until 8 a.m., Eeb. 3. Work that is being permitted includes shuttle tile work and processing not directly related to the orbiters, such as logistics, payloads, laboratories and shops. NASA also directed that employees work only five days a week "with minimum overtime." George Diller, KSC spokesman, described operations as "pretty low-key." Officials expected it to remain that way until the investigation is complete. No layoffs by Lockheed Space Operations Co., KSC's largest employer with about 5,000 workers, are planned, according to a company spokesman. [Lafferty. Florida Today, p. 8A, Feb. 1, 1986.]

February 1: Four thousand Kennedy Space Center employees and their families attended a memorial service on the center, beginning at 11 a.m. The half hour ceremony, led by Director Richard Smith, was held near the Vehicle Assembly Building at the VIP viewing site.

"We have lost seven of our own," Smith told the somber crowd. "Brave men and women who dared to chart the pathways of the universe that future generations will follow. While we mourn their passing, we must not lose sight of their beliefs. The desires of their families and loved ones - the pledge of President Reagan - that we will push on, to fly the space shuttle again, and to build the space station."

Each year, Smith said, a minute of silence would be observed on Jan. 28 at 11:39 a.m. to remember the Challenger crew. During the ceremony, astronaut Robert Overmyer said, "If Judy, Ron, Christa, Greg, Mike, Dick or El were here today, I know they would walk among you, shake your hand...and say: 'Let's go on. Let's find the reason for this tragedy and continue the struggle for fulfillment of man's greatest dream in the stars. For mankind must continue to explore the heavens and unlock the secrets of our universe.'"

To the sound of taps, a pair of NASA helicopters lifted off the shuttle landing strip and whirled along the astronauts' final path and out to sea. They carried KSC processing manager James Harrington to a point 2 or 3 miles offshore from the launch pad, where he dropped a red, white and blue wreath into the ocean. The wreath carried seven red blossoms for the Challenger crew. A videotape from one of the NASA helicopters revealed a group of four or five dolphins close by the wreath moments after it hit the water. [Lunner. Florida Today, p. 1A, Feb. 2, 1986.]

<> Briel Rhame Pointer & Houser, Architects-Engineers (Melbourne, FL), was awarded an open-end contract by NASA to perform studies, design and other services, predominantly electrical in nature, for vehicle, payload and institutional operations at Kennedy Space Center and Vandenberg Air Force Base, CA. ["Melbourne Firm Wins Contract," Florida Today, p. 16C, Feb. 3, 1986.]

February 2: A cone-shaped object that could have been part of Challenger's external tank was airlifted to shore amid increasing speculation that a faulty solid rocket booster may have caused the Jan. 28 tragedy. NASA officials emphasized that they had not positively identified the booster as the cause of the accident. On Cocoa Beach, police reported two metal tank-like cylinders had been turned in; NASA spokesman Charles Redmond wouldn't say if the cylinders were part of the Challenger configuration. Also, the frustrum from a solid rocket booster was airlifted to the Air Force Station and disarmed. The frustrum contained the booster's parachutes, an electronics package and small jettison rockets. The search area covered 6,300 square miles from Melbourne, FL, to Savannah, GA, with jets, helicopters and ships taking part. [Lafferty. Florida Today, p. 1A, Feb. 3, 1986.]

February 3: President Reagan named former Secretary of State William P. Rogers to chair a commission of inquiry into the Challenger disaster. The panel was to report back to the President within 120 days. [The panel's report was delivered to the President on June 6, 1986.] Former Apollo 11 astronaut Neil Armstrong was named as vice-chairman of the 12-member panel.

Other members of the commission were: Maj. Gen. Donald Kutyna, director of space systems and C^3 for the Air Force; Dr. Albert Wheelon, senior vice president of Hughes Aircraft Company; Brig. Gen. Chuck Yeager (USAF-Ret.), former test pilot; Dr. Sally Ride, astronaut; Robert Rummel, former vice president of TWA and an aerospace engineer; Dr. Arthur Walker, Jr., professor of applied physics at Stanford University; Richard Feynman, professor of theoretical physics at Caltech; Eugene Covert, professor of aeronautics at MIT and a NASA consultant on rocket engines; Robert Holtz, former editor of Aviation Week & Space Technology magazine; David Acheson, former senior vice president and general counsel of Comsat. [Defense Daily, pp. 192-193, Feb. 5, 1986.]

February 4: Searchers located a solid rocket booster from the Challenger that could answer some questions about the Jan. 28 accident, said NASA officials, who also denied a CBS News report that portions of the crew compartment and personal effects had been discovered.

"We have said all along that we would love to have that motor everyone has the theory about. This may be our chance.

A destruct mechanism was activated after the explosion when one booster began heading toward a populated area, NASA officials said. Jim Mizell, a spokesman for NASA, said the destruct mechanism was not designed to destroy the boosters, but to eliminate their thrust by shooting the nose cones away and splitting them down the side. Nose cones from both solid rocket boosters were found this weekend off the Georgia coast. [Williams. Florida Today, p. 1A, Feb. 5, 1986.]

February 5: EG&G opened a "Care Line" for KSC employees and their families to relieve the depression experienced as a result of the Challenger tragedy. "People I work with from Kennedy Space Center were already extremely stressed before the shuttle exploded," said Katrina Pountney, a Melbourne psychologist. "They were already tired and stressed by working on two shuttles back to back. The effect was most of the people seemed to be frightened and very numbed." The "Care Line" was expected to operate for at least two months, according to EG&G public relations supervisor Laurie Statmore. [Mittman. Florida Today, p. 1A, Feb. 6, 1986.]

<> NASA recovery units discovered the right solid rocket booster which is thought to be the culprit in the Challenger accident. The search centered on an area of water 1,100 feet deep, more than 30 miles east of the upper end of Mosquito Lagoon, said NASA spokesman Hugh Harris. Searchers were able to pinpoint the site based on radar tracking of debris that fell after Challenger exploded. Ship-based operations in that area later received strong sonar readings indicating the presence of a large object, Harris said.

The U.S. Coast Guard began looking as far north as Cape Fear, N. C., for debris from the Challenger which might have been swept up by the Gulf Stream. NASA released film showing the inside of a warehouse at Kennedy Space Center where shuttle debris has been brought for for investigation. So far, some 12 tons of the wreckage has been retrieved. [Williams. Florida Toda, pp. 1A & 2A, Feb. 6, 1986.]

<> State Senator John Vogt (D-Cocoa Beach, FL) and Rep. Bud Gardner (D-Titusville, FL) met with Gov. Bob Graham and presented him with a letter from the four Brevard County chambers of commerce; it requested the governor's support for establishing a memorial to the Challenger crew members at Kennedy Space Center. Gardner said that Graham agreed to endorse the concept of an Astronaut Memorial fund and to contact President Reagan "offering Florida's leadership in organizing the memorial."

<> Columbia was powered up to allow workers to resume post-flight servicing and generic systems checkout and processing, NASA officials said. The work includes post-flight leak testing and functional testing on the three main engines, general orbiter inspections and routine thermal protection system maintenance. ["Power Flows to Columbia," Florida Today, p. 7A, Feb. 6, 1986.]

February 6: The pattern of Challenger's recovered debris makes it "highly unlikely" the crew compartment will ever be found intact, a source close to the disaster investigation said. The same source also said investigators have gone over thousands of pages of construction, makeup and repair records and have not found anything suspect about the assembly of Challenger. The parts of the orbiter found so far are from the exterior of the vehicle. [Tracy & Leusner. The Orlando Sentinel, p. A-10, Feb. 7, 1986.]

February 7: The search for floating debris from the Challenger accident was terminated because weather had dispersed the debris for hundreds of miles and much of it had settled to the ocean floor. The 11-day search recovered more than 12 tons of wreckage over a 150,000 square miles.

At Kennedy Space Center, Director Richard Smith and U.S. Rep. Bill Nelson (D-Melbourne, FL) conducted a series of talks urging thousands of NASA and contractor employees to put the tragedy behind them and move forward. "When I look back on the weather problems, the meetings we had, the discussions we had, there was nothing that said we didn't do the right thing in that launch," Smith said. He urged workers to re-dedicate themselves as did their predecessors after the Apollo fire that killed three astronauts in 1967. "I'm convinced we'll come out of this better than before." Nelson pledged to fight for money to build another

orbiter. "We're going to find this problem, we're going to fix it and we're going to continue." [Glisch. The Orlando Sentinel, p. A-8, Feb. 8, 1986.]

<> George Thomas Hanchey, age 50, a traffic officer for EG&G, died in an auto accident on his job at Kennedy Space Center. Hanchey was a Brevard resident for 19 years. Survivors include his wife, Glenda Hanchey, three nieces and two nephews. ["George Hanchey," Florida Today, p. 11A, Feb. 9, 1986.]

February 8: Although NASA's plans to launch a shuttle a month may have been halted , workers at Kennedy Space Center have continued with their normal tasks on a scaled-back work schedule. Processing of shuttle cargo around the clock was cut from seven days a week to five, and almost all overtime was eliminated while investigators search for the cause of the Challenger accident.

Major shuttle contractors say they don't plan any layoffs, but concede that may be reconsidered after NASA has a better idea of the launch schedule impact. "We haven't laid any people off and there are no plans for layoffs," said John Williams, spokesman for Lockheed Space Operations Co., the shuttle processing contractor which employs 5,000 people. "Obviously the shuttle program is not set at this point. As the schedule is set we will respond to our shuttle processing responsibilities in an appropriate way, with appropriate manpower," Williams said.

EG&G Florida Inc., the contractor responsible for daily activities such as road and ground maintenance, fire protection, security and other basic services, is sticking to a normal schedule, said Judy Casper, company spokeswoman. "Management has reviewed the scope of work we do, and even with the delay in the launch schedule, we still have a significant amount of work that needs to be done," she said. The company employs about 2,100 people.

NASA's remaining shuttles - Columbia, Discovery and Atlantis - are at KSC in various stages of processing. Columbia's next mission is tentatively scheduled for March 6. Atlantis is in the second bay of the processing building; workers are doing routine maintenance on it.

Cargo processing has continued. "Until a reworked manifest is approved, we'll continue with the original plan" for processing, said NASA spokeswoman Andrea Shay King. [Fisher. The Orlando Sentinel, p. A-16, Feb. 9, 1986.]

February 9: Columbia's Jan. 12 mission (STS 61-C) included damage to rocket seals similar to those suspected in the destruction of Challenger. NASA's list of confirmed cases of damage to seals on shuttle rocket boosters includes the 61-C mission and others as early as the second shuttle flight in 1981. On 61-C, a seal between the bottom two segments of the last booster was eroded. [Lafferty. Florida Today, pp. 1A & 2A, Feb. 10, 1986 and Presidential Commission Report.]

February 10: Investigators at Kennedy Space Center already have examined documents and photographs relating to inspections and assembly procedures for Challenger's boosters, and found nothing unusual, said a source close to NASA's probe. "The media is emphasizing the O-rings, but if you don't look further, you're letting someone else make your decision for you" about what went wrong, said another source among investigators at Kennedy Space Center. At launch, Challenger weighed 4.53 million pounds - 200,000 pounds heavier than any previous shuttle. After 10 hours of freezing temperatures, Challenger lifted off when it was 38 degrees - coldest of any launch. [Fisher. The Orlando Sentinel, pp. A-1 & A-4, Feb. 11, 1986, and Presidential Commission Report.]

February 11: Explorer 1's launch tower at Cape Canaveral Air Force Station may be demolished if an Air Force permit for the destruction is not denied within thirty days. The dismantling, which the Air Force estimates will cost $75,000, will begin in early April and take several weeks, said Lt. Col. Robert Nicholson, public affairs officer at Patrick Air Force Base. John Bruce Medaris, commanding general of Army Missile Command from 1956 till his retirement in 1960, says the Air Force should have maintained the tower all along and should not be allowed to demolish it.

Air Force engineers say it would be impossible to restore the tower to its original form because the structure would not meet building codes, Nicholson said. Just making the tower look like it did in its heyday would cost $1.25 million because it has been

more than half destroyed by rust, he said. On top of that, the Air Force says routine painting and maintenance to protect the tower's joints from rust will cost $77,000 annually. Medaris says that is ridiculous. "We could build a whole new tower for less than that." he said. [Rasche. The Orlando Sentinel, pp. D-1 & D-5, Feb. 12, 1986.]

<> Thomas Utsman, Deputy Director at Kennedy Space Center, said the joints and rings inside [the solid rocket boosters] are never examined once the shuttle leaves the Vehicle Assembly Building at KSC and is rolled out to the pad. "There are no more physical checks," he said. "We don't do any special structural tests." He said the only tests done on boosters at the pad involve checking such mechanisms as their hydraulic and electrical systems. Checks on joints are thought to be unnecessary because engineers say the weight of each booster makes it very secure. Once the 11 booster segments are bolted together, a pressure check is done to ensure the O-rings are not damaged, Utsman said. The pressure used in the test has been increased above specifications used earlier in the shuttle program, he added. "We've always treated those seals with tender loving care. We recognize it's a crucial part of the flight hardware." [Glisch & Fisher. The Orlando Sentinel, p. A-8, Feb. 12, 1986.]

<> NASA is considering modifying a Boeing contract so Lockheed Space Operations Co. [SPC] can take over the work while the shuttle is grounded, a Boeing spokesman said. "It could mean layoffs. It depends on how NASA chooses to change that contract," said Leslie Neilhouse, manager of community and public relations for Boeing. As part of the contract, Boeing is preparing a mobile launch platform at KSC, which it was scheduled to turn over to Lockheed after completing the work, Neilhouse said. NASA is considering moving up the turnover date to give Lockheed more work while the shuttle is grounded, she said. About 260 Boeing employees are involved with the contract. At worst, the layoffs would number less than 260, but Neilhouse said the company, which employs about 500 at KSC, would not know how many would be affected till NASA makes its decision. [Perez & Ash. Florida Today, p. 1A, Feb. 12, 1986.]

<> Deputy Director Thomas Utsman strongly defended NASA's quality control program, saying safety has not been compromised to keep pace with an increasing number of

launches. He said also that technicians have not been overworked and have not cut corners in preparing Challenger and other shuttles for liftoff. "Obviously, if people were fatigued it could have been a factor, but we don't feel there was a fatigue factor," he said. "We're not running a sweat shop out here."

KSC's deputy director released figures showing the number of NASA quality control inspectors has dropped from 57 before Lockheed took over from Rockwell International to 48 now. The same figures show Lockheed currently has 295 inspectors on the job compared to 262 quality control experts employed by 17 contractors before Lockheed won the processing contract. Although some daily functions are no longer monitored by NASA, Utsman said the change had not affected work done on shuttles. "There have been no changes in policy in flight hardware since STS 1," he said. He also said the same procedures and inspections had been followed in assembling the twin solid-fuel booster rockets used for all shuttle flights. "We verify all critical steps in the process," he said.

Utsman conceded that Lockheed had greatly increased a program called "designated verification" in which 776 technicians and workers certify their own work. He said, however, that these workers perform such non-flight related work as checking the pressure on tractors used to move orbiters around the Orbiter Processing Facility. [Glisch. The Orlando Sentinel, p. A-8, Feb. 12, 1986 and Presidential Commission Report.]

February 12: Search crews may have recovered parts of a communications satellite that was aboard Challenger's 51-L flight, according to a NASA official. Earlier sonar readings indicated the object might be part of a rocket booster that was to deploy a $100 million satellite. NASA spokesman Hugh Harris said it was "very likely" the USS Preserver had recovered some of the satellite's motor section, but he said no official statement would be released until the NASA investigative task force approved. [Lafferty. Florida Today, p. 2A, Feb. 13, 1986.]

February 14: A millisecond by millisecond account of what happened from the time Challenger lifted off till it exploded was released by the presidential commission on the accident at the conclusion of two days of meetings and inspections at Kennedy Space Center. The chronology indicated the first sign of trouble was a puff of smoke spotted by NASA cameras about half a second after the two solid rocket boosters were ignited.

Commission Chairman William P. Rogers declined comment on a report that said NASA was investigating whether a leak of super-cold hydrogen from the external tank may have damaged the booster seals (or O-rings). Rogers said the orbiter had been virtually eliminated as having a role in the accident. He also promised that the commission would finish its work before the 120-day deadline imposed by President Reagan. Commission members spent the morning touring KSC's Vehicle Assembly Building and Launch Complex 39B from which Challenger was launched. Officials from Morton Thiokol Inc., prime contractor for the solid rocket boosters, were also questioned during the meetings, Rogers said. [Lafferty. Florida Today, pp. 1A-2A, Feb. 15, 1986 and Presidential Commission Report.]

February 17: NASA spokesman Jim Mizell (located at KSC) said the number of NASA officials who will be removed from the agency's probe of the Jan. 28 Challenger accident was not yet known. Among those thought likely to be removed was KSC Director Richard Smith. ["Shuttle Chief, Others, Likely to Leave Probe," USA Today, p. 3A, Feb. 18, 1986.]

February 18: Challenger commission member Richard Feynman visited Kennedy Space Center to inspect the infrared equipment that recorded abnormally cold temperatures on the shuttle's booster rockets before the orbiter was launched. Feynman said he planned to check the hand-held cameras that logged low temperatures of 7 to 9 degrees on the right booster. The left booster experienced 19 to 24 degree temperatures. Feynman told The Los Angeles Times he confirmed that the "unusually low" infrared temperature readings taken by an ice inspection team three to five hours before the launch were accurate, despite NASA officials' questions about the readings. [Glisch & Tracy. The Orlando Sentinel, p. A-4, Feb. 19, 1986.]

February 21: The current astronaut corps has provided some 24 members to the investigation of the Challenger accident and most of these are currently assigned to Kennedy Space Center, said a NASA spokesman. "The astronauts have a broad base of familiarity with the shuttle that is fairly unique in NASA. That makes them of obvious value to the investigation," said JSC spokesman John Lawrence. "Besides," he added, "the astronauts' office is not entirely disinterested in this investigation. They have their own interest in assuring that the investigation is being conducted properly."

Astronaut Sally Ride, a member of the presidential commission, has been at KSC this week gathering information for the panel's investigation. In addition, astronaut Bob Crippen has been at KSC monitoring the search for debris from the orbiter. Crippen reports directly to Richard Truly, new director of the shuttle program. Thirteen other astronauts are at KSC assisting in the investigation: James Bagian, Karol Bobko, Manley Carter, Mike Coats, Robert "Hoot" Gibson, Steve Hawley, Woody Spring, Steve Nagel, Bryan O'Connor, Robert Overmyer, Brewster Shaw, William Shepard and David Walker. [Williams. Florida Today, p. 2A, Feb. 22, 1986.]

February 24: Richard Truly, new shuttle program chief and former shuttle astronaut, arrived at Kennedy Space Center promising to learn what NASA investigators know and to "fully support" the presidential commission studying the accident. He said he would have to review all options before recommending a new shuttle launch date. Truly, 48-year-old native of Meridian, Mississippi, promised to "make sure that we re-establish the media's belief that NASA is a forthcoming public institution." He also said he planned to meet with top officials from KSC, JSC and Marshall Space Flight Center to organize a way to "fully support the presidential commission to study this accident. I can assure you that, after talking to the commisson, the whole thing is simply to get the facts. I know that's their purpose and I'm sure that's what will be done."

Truly said he had not been briefed on discussions between Morton Thiokol officials and NASA concerning the shuttle's rocket boosters prior to the launch of Challenger. He said his trip to KSC was "the first opportunity I've even been able to take a look at the

firsthand data. Prior to that, I've only read about the accident in the press." [Lafferty. Florida Today, p. 1A, Feb. 25, 1986.]

February 25: A "chain of events" led to the destruction of Challenger a month ago, according to shuttle chief Richard Truly. Matching photographs with computer information and with debris will reveal the series of events "so that we will be able to establish a very probably cause," Truly observed during a press conference at Kennedy Space Center. "It is quite clear," he said, that "we need to examine all of the process that NASA has in its flow and its procedures as we proceed to launch. I have already assured everyone we are going to do that and we are. The main thing I did (while at KSC) was familiarize myself with what has gone on in the investigation." Accompanied by an investigator from the National Transportation Safety Board, Truly also toured KSC hangars where shuttle debris is stored. He called the two-day trip "very educational" and said, "My faith is renewed in the NASA system." [Lafferty. Florida Today, p. 2A, Feb. 26, 1986.]

February 26: W & J Construction Co. (Cocoa, FL) was awarded a $9.95 million contract to build an orbiter refurbishment facility at Kennedy Space Center, NASA said. The project will enhance KSC's ability to meet anticipated demands for processing shuttles between flights, the space agency said. The facility will include two hangar bays, one 95-feet-tall, the other smaller, and will provide needed space apart from facilities now used for normal operations flow, according to NASA. ["Cocoa Firm Wins Shuttle Contract," Florida Today, p.20C, Feb. 27, 1986.]

<> Workers who checked for ice on the Challenger launch pad testified that low temperatures on the shuttle's booster rockets were not unusual and not likely caused by a leak from the supercold external fuel tank. The workers, members of a team that cleared ice from the launch pad Kennedy Space Center and took temperature readings with an infrared gun, spoke before the presidential commission investigating the accident. [Fisher. The Orlando Sentinel, p. A-13, Feb. 27, 1986, and Presidential Commission Report.]

February 28: The layoff of 450 employees, NASA said, should be the extent of the major job losses as a result of the Challenger explosion. The loss of those

jobs - and 650 others being eliminated because of the completion of renovation work on pad 39B - was announced by NASA. Thomas Utsman, deputy director at KSC, said there is a chance that some NASA employees could be layed off in coming months but any further reductions would be "minor. These rumors of 3,000 and 4,000 people [losing their jobs] are just that - speculative, unfounded rumors," he said. The trimming of 450 jobs from the private contractors' workforce was promptd by an anticipated one-year grounding of the shuttle program, Utsman explained. [Glisch & Hinman. The Orlando Sentinel, p. A-1, Mar. 1, 1986.]

<> KSC Director Richard Smith told the presidential commission on the Challenger accident that NASA designed the shuttle to operate between 31 and 99 degrees. "There was a 99 percent chance that we would not be outside these temperatures in this part of Florida." He told the commission that the design of the launch complex never took into account the likelihood of temperatures below the freezing point.

Smith said building launch pad equipment to handle freezes was not "cost justified" because the Cape did not have freezing temperatures in the 10 to 15 years before planning for the shuttle began in the early 1970s. To keep pipes from freezing and bursting, the space agency installed a system to bleed water from the equipment. This is similar to leaving the water tap on in a home to protect the pipes during a freeze, Smith said. He said the only weather worry NASA had about the boosters was that the fuel temperature remain above 40 degrees, the minimum allowable operating temperature. He said the fuel temperature was 55 degrees at launch. [Thomas. The Orlando Sentinel, pp. A-1 & A-7, Mar. 1, 1986.]

March

March 1: NASA officials are investigating possible uses of launch pad heating units and a safety device on the solid rocket boosters to prevent hot gases from escaping between segments. Developed at Kennedy Space Center for shuttle launches at Vandenberg Air Force Base in California, the heating unit is operated by two jet engines housed in a nearby building. The engines pump hot air through a pair of pipes. Each pipe has an outlet at the base of the shuttle, shooting heated air up between the boosters and the external tank, said Vandenberg spokeswoman Sharon Walker. [Williams. Florida Today, p. 4A, Mar. 2, 1986.]

March 2: Theodore A. Poppel, 67, a retired NASA engineer, died at Jess Parrish Memorial Hospital (Titusville, FL). Poppel was born in Germany; he was a NASA engineer for 30 years and lived in Titusville since 1965. Survivors include his wife, Ruth, mother (Agnes Haver of Germany); daughters Helga Lamb and Gerda Kibble; and one grandchild. He was to be buried on March 4 in Titusville. ["Former NASA Engineer Dies at 67 in Titusville," Florida Today, p. 11A, Mar. 4, 1986.]

March 3: NASA acknowledged that shuttle flights would be halted for at least 18 months. The agency suggested that it might use some expendable rockets to pick up the slack caused by the Challenger disaster and ease scheduling pressures on future shuttles. [McQuay & Mecham. Florida Today, p. 1A, Mar. 4, 1986.]

<> A record attendance at Spaceport USA is due in part to the Jan. 28 Challenger accident, according to Arnold Richman, chief of Kennedy Space Center's Visitors Services Branch. An estimated 200,000 people toured the KSC visitors information center in February, breaking a previous record of 146,950. "Before the accident we were up about 25 percent over last January," Richman said. "Afterwards, that surge just kept on gaining and going." He said he has noticed a marked change in the outlook of Spaceport USA visitors since the accident. "It's a little more intensive for the adults," Richman said. "They're more inquisitive. It's a more somber attitude. People are out there to read and see and learn about what is happening with our space program. When they're out here, they're much more attuned to what's going on." [Booth. Florida Today, p. 3A, Mar. 4, 1986.]

March 4: Military officials asked area shrimpers and scallopers to stay out of a larger area east of Cape Canaveral to facilitate the search for debris from Challenger. Officials added another 100 square nautical miles on the north boundary of the search area because it covers the path of the right solid rocket booster. Air Force Col. Edward O'Connor, head of Challenger salvage operations, noted in a meeting at Port Canaveral that most fishermen had stayed out of the current search area and he thanked them for their restraint.

Commercial fishermen at the meeting said the restrictions had not significantly affected their business so far, but said they were concerned because shrimping areas had been spotted within the new addition to the search area. O'Connor said a sonar mapping of the area should be complete by April 1. "We're going to try to get out of there as quickly as possible." [Johnson. Florida Today, p. 2A, Mar. 5, 1986.]

March 5: NASA is proceeding with the construction of two projects at Kennedy Space Center worth $30 million. Work began last week on the $10 million Orbiter Modification Facility that will be used to prepare shuttles for flight. Construction also is continuing on a $25 million plant where the shuttle's solid-fuel rocket boosters will undergo final assembly and refurbishing. Officials said the projects will provide a total of 475 jobs before construction is finished.

NASA spokesman Jim Ball said the new orbiter facility is needed because the Vehicle Assembly Building had become cramped. "We had what amounted to a bottleneck," said Ball. "Whenever you were bringing in an external tank, you ran into conflicts." He said the facility will have a 95-foot-high bay where one orbiter can be stored while technicians do necessary work between flights. He also said the halt of the shuttle program would probably not affect work at the facility once it opens. "The only curtailment we currently have is not authorizing any overtime," he said. [Glisch. The Orlando Sentinel, p. A-8, Mar. 6, 1986.]

<> Don Dallas, 45-year-old Kennedy Space Center technician, received second-degree burns on his hands during an electrical accident at Pad 39A, said Lockheed spokesman Stuart Shadbolt. "He was trying to cut off a portion of the line itself," said Shadbolt. "In so doing, he caught the electricity in his hands." Dallas was taken to KSC's occupational health facility after the accident. He remained in satisfactory condition through the night in Titusville's Jess Parrish Memorial Hospital, said a spokesman for the hospital. ["Lockheed Worker Burned at Pad 39A," Florida Today, p. 2A, Mar. 6, 1986.]

March 6: The launch of conventional unmanned rockets from Cape Canaveral is receiving new attention with the hiatus in the shuttle program. "We are continuing to implement the schedule that calls for the launch of seven expendable vehicles between now and August 1987," said NASA spokesman George Diller. The next unmanned launch is scheduled for May 1 and will deploy a weather satellite to be used by the National Oceanic and Atmospheric Administration. [Williams. Florida Today, p. 4A, Mar. 7, 1986.]

March 8: Navy divers discovered the crew compartment of the Challenger including the remains of the astronauts, in 100 feet of water off the Cape Canaveral coast, NASA announced. NASA reported that the seven astronauts ' families had been notified and said, further, that the agency will continue a news blackout on the discovery of human remains. "In deference to family wishes, NASA will not make further comment until recovery operations and identifications are complete," the official statement said. The remains were taken to Patrick Air Force Hospital, where officials from the Armed Forces Institute of Pathology will identify them. NASA spokesman Hugh Harris would not comment on the condition of the crew cabin or the remains; neither would Air Force Col. Edward O'Connor, who is in charge of the salvage operations. [Lafferty & Haj. Florida Today, pp. 1A & 2A, Mar. 10, 1986.]

<> Some remains and crew cabin wreckage were reported to have been brought ashore secretly under cover of darkness by the Navy salvage ship USS Preserver. The vessel entered Port Canaveral without its running lights on. Navy Lt. Cmdr. Deborah Burnette said, however, that the Preserver returned to port to unload an 8-foot piece of an old Titan missile recovered from

the ocean bottom. [Lafferty. Florida Today, pp. 1A & 2A, Mar. 11, 1986.]

March 9: A freeze on hiring by Boeing and Rockwell at Johnson Space Center in Houston would not affect Kennedy Space Center workers, said Boeing spokeswoman Leslie Vock Neilhouse. She did confirm, however, that hiring for a Boeing KSC contract for processing flight equipment had been slowed. ["Rockwell, Boeing Ordered to Halt Shuttle Hiring," Florida Today, p. 2A, Mar. 10, 1986.]

<> In an internal memoranda to NASA managers written two weeks before the Challenger tragedy, chief astronaut John Young questioned the use of a Kennedy Space Center runway for shuttle landings. Young wrote that the three-mile runway was unsuitable for shuttle landings because of its length and lack of stabilized shoulders. ["Young: He Has Written Harsh Memos Before," Florida Today, p. 2A, Mar. 10, 1986 and 51-L Support Documentation located in the KSC Library Archives.]

<> At least five pairs of the American bald eagle have nested and produced young this year at the Merritt Island National Wildlife Refuge, according to Assistant Refuge Manager Mendel Stewart. [Bumpus-Hooper. The Orlando Sentinel, p. 1D, Mar. 10, 1986.]

March 11: Seven caskets have been delivered to federal officials for the astronauts killed in the Challenger accident. The caskets were ordered at about midnight March 10 from a South Brevard funeral home. NASA spokesman Hugh Harris said he knew nothing about the caskets as he and other NASA officials maintained their silence about crew remains. [Lafferty. Florida Today, p. 1A, Mar. 12, 1986.]

<> Two problems discovered during the seven delays of Columbia's Jan. 1986 launch (61-C) could have caused disastrous consequences, according to a NASA internal memo. A temperature sensor wedged in a valve leading to a main engine could have caused the shuttle to blow up eight minutes after launch, said Arnold Aldrich, manager of the shuttle project at Houston. In another incident, 18,000 pounds of liquid oxygen were dumped from Columbia's external fuel tank Jan. 6. If the shuttle had been launched, the engines could have quit

before the craft entered orbit, leading to a possible emergency landing and "serious safety of flight consequences," the NASA memo said. Congressman Bill Nelson (D-Melbourne, FL), aboard as a mission specialist, said his confidence in NASA was unwavering. [Booth. Florida Today, p. 1A, Mar. 12, 1986.]

March 12: Kennedy Space Center's runway is safe and will continue to be used when the shuttle program resumes, according to Dr. Charles Niebauer, chief of launch and landing operations. "We think the landings at Kennedy, given good weather conditions, are safe, and we don't think there will be a change in that philosophy," he said. [Halvorson. Florida Today, p. 3A, Mar. 13, 1986.]

March 13: A first round of layoffs at Kennedy Space Center began when 263 employees of Lockheed Space Operations Corp. collected their final paychecks. Another 367 Lockheed workers will be let go May 2, said company spokesman John Williams. Others laid off included 150 employees of Planning Research Corp. and 90 employees of Boeing Aerospace. McDonnell Douglas said it would lay off about 90 workers over the next six months. [Glisch. The Orlando Sentinel, p. A-6, Mar. 14, 1986.]

<> The remains of Challenger astronauts underwent examinations at Cape Canaveral Air Force Station rather than at the Patrick Air Force Base Hospital. Officials with NASA and the Armed Forces Institute of Pathology decided to move the remains after a "re-examination of the requirements and options," said a spokesman of the transfer to NASA's Life Sciences Facility, a converted hangar outfitted with a number of laboratories. [Lafferty. Florida Today, p. 1A, Mar. 14, 1986.]

March 16 A majority of Space Coast residents believe the space shuttle will be flying again within the next 12 to 18 months, according to a survey conducted by Florida Today. Almost 73 percent of the people polled agree with NASA's assessment that the next shuttle will fly before the fall of 1987. ["We Believe Shuttle Will Fly by 1987," Florida Toda, p. 1A, Mar. 17, 1986.]

<> Richard Smith, Director of Kennedy Space Center, said the presidential commission investigating the Challenger accident "needlessly" damaged the

reputations of some key NASA officials. In a Washington Post interview, Smith said some of those workers might, in turn, decide to leave NASA. He also said "98 percent of the pressure" to launch shuttles came from the media. In a statement released later the same day, Smith said he did not mean "to make a frontal attack on the integrity or capability of the presidential commission."

Grady Williams, former KSC director for design engineering, said Smith was correct in saying the commission had reversed the course investigations normally take - which is to understand why an accident occurred before looking into management practices. Williams, a Cocoa resident, also said, "I'm sure a lot of those [NASA] people are discouraged. I'm discouraged and I haven't been out there for 10 years." Williams also said he doubted media pressure had anything to do with shuttle launch decisions. Gordon Harris, former KSC public affairs chief, agreed. "I don't believe you (media) people have that much influence," he said. "Never, to my knowledge, did anyone mention the press in the context of a launch decision." [Lafferty. Florida Today, p. 2A, Mar. 17, 1986.]

March 17: Atlantis was moved from the Orbiter Processing Facility to the Vehicle Assembly Building, NASA officials said. The newest shuttle was expected to remain in the VAB pending a decision on whether to unstack solid rocket boosters that already have been attached to the vehicle, NASA spokesman George Diller said. The unstacking was proposed so officials could check the O-rings that seal the segment joints. [Lafferty. Florida Today, p. 2A, Mar. 18, 1986.]

March 19: Plans for a memorial to honor the Challenger crew and other astronauts who died on their jobs have won the initial backing of NASA administrators, organizers of the project said. Officials of NASA and the non-profit Astronauts Memorial Foundation met for the first time in Washington to discuss plans for a memorial at the Kennedy Space Center. NASA agreed with the idea in principle. [Gandhi. The Orlando Sentinel, p. A-6, Mar. 20, 1986.]

<> The 23rd Space Congress, scheduled to open April 22 in Cocoa Beach, will focus on the future of space exploration rather than dwell on the Challenger

explosion, said organizers of the annual event. U. S. Rep. Bill Nelson (D-Melbourne, FL) will make the keynote address to open the three-day meeting. [Lafferty. Florida Today, p. 2A, Mar. 20, 1986 and "Rep. Nelson Scheduled to Deliver Keynote Address," Florida Today, p. 2A, Mar. 20, 1986.]

March 24: Joseph L. Tyre, a construction worker at Kennedy Space Center, was killed after he fell 90 feet while installing a bridge crane in a new facility, officials said. The employee of Cherokee Steel Erectors (Orlando, FL), Tyre apparently was pulling a cable while installing the crane in the cargo Hazardous Servicing Facility when he fell at 2:45 p.m. He was taken to KSC's infirmary where he died a short time later. The accident is under investigation. ["Cape Worker Dies After Falling 90 Feet," The Orlando Sentinel, p. D-3, Mar. 25, 1986, and Lafferty. Florida Today, p. 2A, Mar. 25, 1986.]

<> Military pathologists have identified the remains of all seven Challenger astronauts and NASA may soon make an official announcement, a source close to the accident investigation told The Orlando Sentinel. NASA officials have privately said that a memorial service would be held at the appropriate time and the remains turned over to the families. Meanwhile, the search for key pieces of Challenger's right solid rocket booster continued and was expected to last several more weeks. [Fisher & Glisch. The Orlando Sentinel, pp. A-1 & A-10, Mar. 25, 1986.]

<> A body discovered March 22 in remote woods near the Kennedy Space Center has been identified as Frank "Buster" Sims, 49. The Mims resident and EG&G electronics engineer had been missing for two weeks, a sheriff's spokeswoman said. "Investigators are working it as a suspicious death," she said. [Cason. Florida Today, p. 3A, Mar. 25, 1986.]

March 30: Videotapes of underwater shuttle debris may hold valuable information about new commercial fishing grounds off Brevard, a fisheries researcher said. "This could be a completely unique opportunity," said Warren Rathjen, a researcher for the Tampa-based Gulf and South Atlantic Fisheries Development Foundation. Rathjen has written NASA requesting that videotapes taken by manned and unmanned submarines searching for debris from Challenger be made available to

researchers. NASA spokesman Dick Young said he isn't sure what would become of that type of request, but added that NASA "philosophically" supports sharing information with researchers. [Lafferty. Florida Today, p. 2A, Mar. 31, 1986.]

March 31: NASA canceled work restrictions on launch pad 39B from which Challenger made its liftoff Jan. 28. The move frees crews to perform normal maintenance and processing work, said NASA spokesman Dick Young. NASA plans to move the mobile launch platform at the pad to a storage area northeast of the Vehicle Assembly Building; that move should begin April 1. [Lafferty. Florida Today, p. 2A, Apr. 1, 1986.]

<> Spaceport USA set another record for the number of people taking bus tours of the complex, according to officials with the KSC attraction. Some 196,000 people took the KSC bus tour in March, breaking the previous record of 190,000 set in March 1985. The 152,000 people who took the tour in February of this year set a record for that month. The record of 213,000 people in one month was set in July 1972. ["Spaceport USA Set Record for Bus Tours in March," Florida Today, p. 2A, Apr. 2, 1986.]

April 1: The space shuttle Discovery was moved from the Vehicle Assembly Building to an Orbiter Processing Facility to clear an area to store Atlantis's external tank temporarily. Discovery is expected to be returned to the VAB in several days. [Lafferty. Florida Today, p. 2A, Apr. 1, 1986.]

<> The locally based Astronaut Memorial Foundation won NASA's approval to build at the Kennedy Space Center the national memorial to America's "fallen astronauts. We got everything we wanted," said David Dickerson, press aide to U.S. Rep. Bill Nelson (D-Melbourne, FL). NASA and the Astronaut Memorial Foundation will work closely together through Chuck Hollinshead, KSC's director of public affairs. The agreement is to be spelled out in a memorandum. [Heller. Florida Today, p. 1A, Apr. 2, 1986.]

April 3: Silt stirred up by rough weather recently covered what remained of the Challenger crew cabin, forcing salvors temporarily to half recovery efforts, NASA officials said. About 75 percent of the crew cabin had been retrieved. NASA said "alternate means" of recovering the remaining wreckage are being studied. [Lafferty. Florida Today, p. 2A, Apr. 4, 1986.]

<> Two weeks before Challenger's destruction, technician Dave Eastman, 46, was drenched with a potentially lethal dose of toxic hydrazine rocket fuel, reported the Florida Today newspaper. Eastman, a Lockheed Space Operations Co. launch pad worker, was wearing protective gear at the time of the accident. He was filling Challenger's left solid rocket booster hydraulic system with hydrazine when a quick-disconnect fuel valve malfunctioned, dumping 3.2 gallons of highly toxic fuel into the air. [Lunner. Florida Today, p. 2A, Apr. 4, 1986.]

April 6: An Air Force study concluded that Kennedy Space Center's shuttle runway needs a number of improvements to deal with increased air traffic. Completed last year before the Challenger tragedy, the study found the three-mile runway had "evolved into a restricted airport." The report also noted inadequate or unsafe conditions which violated Air Force regulations. NASA officials associated with the KSC landing facility said

they had not seen the report and could not comment. However, Dick Lyon, KSC's deputy director of engineering development, said the landing facility is under review as a result of the Challenger tragedy and the ongoing investigation by the presidential commission. [Lafferty. Florida Today, p. 1A, Apr. 7, 1986.]

April 7: A study by the Federal Reserve Bank of Atlanta predicted that continued layoffs in the space industry "would multiply the (detrimental) effects on the local economy as diminished company payrolls would mean less local consumer spending. Tourism would surely feel the effects of a delay as many tourists were attracted to the Space Coast to witness launches," the study says. [Ash. Florida Today, p. 14C, Apr. 8, 1986.]

<> Salvors brought a 34-foot piece of the shuttle's left fuselage bearing an American flag into Port Canaveral this weekend. Another 12-foot-long piece was recovered as was a piece of the right wing measuring 35 feet in length. These were taken to a warehouse at Kennedy Space Center where investigators are piecing together debris in an attempt to learn more about how the Challenger was destroyed. Meanwhile, the crew of a research submarine involved in the debris search videotaped the crew cabin area to ensure that no debris was overlooked. [Lafferty. "Weekend Work Nets Huge Debris Finds" ; "Scallop Boat Retrieves More of Crew Cabin," Florida Today, p. 2A, Apr. 8, 1986.]

April 8: NASA was "walking right on the edge of a cliff" by using poorly designed solid rocket boosters to help launch shuttles, said James R. Thompson, vice chairman of NASA's internal probe of the Challenger explosion on Jan. 28. [Thompson was named director of Marshall Space Flight Center to succeed the retiring William Lucas on Aug. 5.] Speaking at a news conference at Kennedy Space Center, Thompson said, "There's really no other way I can say it. This one we just fumbled."

Thompson said his task force concluded that the explosion was caused by a failure in a booster joint. "Clearly that joint has to be redesigned," he added. NASA had been aware of potentially catastrophic design problems since 1981 and was wrong to continue flying the shuttle. "Looking back on it, that joint...is quite marginal. It winked at us on some flights," he

said. Environmental factors - freezing weather at launch, strong winds aloft - also may have affected the O-rings or putty, Thompson said. [Lafferty. USA Today, p. 3A, Apr. 9, 1986 and "J. R. Thompson Appointed Director," Marshall Star, p. 1, Aug. 6, 1986.]

April 9: Challenger's crew cabin was relatively intact following the disaster Jan. 28, but apparently started to crumble as it fell toward the Atlantic Ocean, officials said. An analysis of the nose section - which holds the crew cabin - showed that it suffered little damage from the mid-air fire, said Terry Armentrout of the National Transportation Safety Board. His remarks were made during a press tour of the Kennedy Space Center facilities where NASA is storing the Challenger wreckage.

Despite some unique problems with analyzing the debris, Armentrout said investigators have concluded that most of the pieces were traveling at 140-180 mph when they hit the water, that the orbiter struck the external tank sometime during the explosion, that the right solid rocket booster...smashed into the external tank and at some point struck Challenger's right wing and that much of the external tank was broken up before the shuttle exploded, a theory that had been implied by NASA officials earlier. [Lafferty. Florida Today, pp. 1A & 2A, Apr. 10, 1986.]

April 11: Eight chunks of Challenger's right solid rocket booster, including a 3,000-pound piece from the same joint that triggered the shuttle explosion, have been recovered by NASA salvage ships. The 14-foot-by-7-foot piece of wreckage, however, is from an area opposite the section where the flames appeared. Nevertheless, Navy spokeswoman Lt. Cmdr. Deborah Burnette said the find was "significant" because it will help salvors pinpoint the area where the suspect booster o-ring joint is presently located. "If the weather holds and we have no equipment failures, I would expect that we will be able to recover a significant portion of the right booster that we are looking for," Burnette said. [Halvorson. Florida Today, p. 1A, Apr. 12, 1986.]

<> Safety experts are examining data on the destruction of the Challenger to see whether the offshore zone barred to ships and planes during shuttle launches should be expanded in the future. Marvin Jones, director of

ground safety at Kennedy Space Center, said although experts originally thought the downrange safety zone was large enough, he "wouldn't be surprised" if it is increased. [Glisch. The Orlando Sentinel, p. A-7, Apr. 11, 1986.]

April 12: In a report presented two weeks before the Challenger accident, management experts recommended a complete reorganization of the shuttle program that would move basic control of Kennedy Space Center to a new office in Washington. The report, prepared by the Academy of Public Administration, was aimed at streamlining administration of the program as the number of flights increased and clearly separating the agency's research and development work from shuttle operations. [Fisher. The Orlando Sentinel, pp. A-1 & A-10, Apr. 13, 1986.]

April 13: Salvage crews recovered part of a bulkhead from Challenger's payload bay while searching for wreckage from a $100 million satellite (tracking and data relay) broke free when the shuttle exploded. ["Crews Raise Section of Payload Bay," The Orlando Sentinel, p. A-4, Apr. 14, 1986.]

April 14: A critical part of Challenger's right-hand SRB - the area from which a fatal fuel leak occurred - has been recovered. The partially melted, 2-ton chunk of debris is from the bottom center segment of the faulty right booster. "It is the piece of evidence that we have been looking for in our total search and salvage operation," Tom Moser, NASA deputy associate administrator for space flight said. "If, in fact, this is the joint, it is one of the most important pieces we've found." Eugene Covert, a member of the presidential commission investigating the explosion, arrived at KSC in the evening to examine the wreckage. More commission members were expected to arrive April 15. [Lafferty. Florida Today, p. 1A, Apr. 15, 1986.]

<> NASA's Acting Administrator William Graham and newly appointed shuttle program chief Richard Truly arrived at Patrick Air Force Base to review a space agency report about the shuttle disaster; the report is due April 18. Both Truly and Graham were to be at KSC April 15. [Lafferty. Florida Today, p. 2A, Apr. 15, 1986.]

April 15: William Graham, NASA's acting administrator and Richard Truly, shuttle program chief, examined a key piece of booster rocket wreckage as part of a briefing on the agency's internal report on the Challenger. Neither would comment on the report, only two or three copies of which exist at present, according to NASA spokeswoman Shirley Green. "It's voluminous; it fills file cabinets," she said. Green also said it will be up to the presidential commission to determine when the report will be made public. [Glisch. The Orlando Sentinel, pp. A-1 & A-9, Apr. 16, 1986.]

<> Security was tight at Kennedy Space Center and area military bases after the U.S.'s retaliatory attack on Libya. Guards at KSC security gates stopped all cars and carefully checked badges. NASA spokesman Hugh Harris said other security measures were in effect but would not discuss them. [Gandhi. The Orlando Sentinel, p. A-8, Apr. 16, 1986.]

April 17: Salvage crews came to port with a jagged chunk of Challenger that bore the orbiter's name. The word "Challenger" - painted in blue letters - was clearly visible on the portion of the right wing that was recovered by the Navy rescue and salvage vessel USS Opportune. [Sellers. Florida Today, p. 2A, Apr. 18, 1986.]

April 18: EG&G Florida Inc., the base operations contractor at Kennedy Space Center, said it had laid off 25 workers in a reduction forced primarily by the grounding of the shuttle program. EG&G spokeswoman Laurie Statmore said the employees were given a two-week notice or two weeks of severance pay. The company had been able to reduce the impact of the space center's slowdown because it had been hiring conservatively since early January, she said. [Hinman. The Orlando Sentinel, p. A-7, Apr. 19, 1986.]

<> NASA handed over its preliminary report on the Challenger tragedy to the presidential commission investigating the incident. Officials at Kennedy Space Center, however, said they did not expect the 24 cardboard boxes filled with documents from three NASA facilities would produce any revelations regarding the tragedy. "A great deal of this already has been released during (the Rogers panel's) open hearing," said Hugh Harris, NASA spokesman. "I'm not sure there will be any surprises." NASA spokesman Dick Young said

the documents were being "hand-carried to the commission" by James Jackson, Jr., secretary for the Data and Design Analysis Task Force in Houston. [Sellers. Florida Today, p. 2A, Apr. 19, 1986.]

April 19: NASA announced that it had recovered remains of all seven Challenger astronauts and had halted further efforts to salvage the downed orbiter's crew cabin. "Final forensic work and future planning in accordance with families' desires is expected to be completed within the next several days and will be announced when appropriate," said Richard Truly, NASA shuttle chief. [Glisch. The Orlando Sentinel, p. A-4, Apr. 20, 1986.]

April 21: Technicians hoped by April 23 to complete the unstacking of a solid rocket booster that could provide clues about the Challenger accident, a NASA engineer said. Roy Ramsey, manager of solid rocket booster operations at Kennedy Space Center, said the booster's nose assembly was removed around noon April 20 and the first of four fuel-laden booster segments was near being unstacked today. ["Technicians Hope to Complete SRB Unstacking by Wednesday," Florida Today, p. 2A, April 22, 1986.]

April 22: U. S. Rep. Bill Nelson (D-Melb., FL) delivered the keynote address to open the 23rd Annual Space Congress in Cocoa Beach, FL. "In the aftermath of the national tragedy we have all experienced, it is more important that you are convening now," he said. "This is sending out a message across the land about the future of aerospace development. The enthusiasm is beginning to build again as we are in the process of binding and healing. It is very much the character of America that when its back is against the wall, we move on."

Nelson added that the recent explosion of a Titan rocket at Vandenberg AFB (CA) "is going to add to the urgency" of getting the space program back on track. "We'll find the problem, fix it and get on with the program." The congressman also renewed his proposal for a U. S.-Soviet "summit" in space. "Wouldn't it be something to have a summit meeting in space, where the two superpowers would have the perspective I had in political decisions affecting the destiny of this planet?" [White. Florida Today, p. 2A, Apr. 23, 1986.]

<> The top segment of an unused solid rocket booster was unstacked early this morning, said NASA spokesman Jim Ball. The booster was disassembled to allow officials a chance to check it for possible clues to the Jan. 28 Challenger explosion. Investigators want to know if a hydraulic "rounding tool" used to reshape a segment on the unused booster caused any problems with the booster's synthetic rubber seals known as O-rings. The rounding tool had been used to reshape a segment on the right booster used to launch Challenger. [Lafferty. Florida Today, p. 2A, Apr. 23, 1986.]

<> Alex Bosmeny, formerly a photographer for Technicolor Government Services Inc. (now called TGS), sued Rockwell International Corp., claiming he was injured after workers negligently spilled rocket fuel while performing maintenance on the Challenger in 1983. At that time Bosmeny was waiting to take pictures of the orbiter in the Vehicle Assembly Building. According to the suit filed in Brevard Circuit Court, on April 17, 1983, the highly toxic fuel - monomethylhydrazine - leaked from several plugs in an orbiter engine while workers performed maintenance on the Challenger which had just returned from California after a space mission. Rockwell, which has a contract with NASA to process the shuttles after flights, failed to turn on the alarm or exhaust system, evacuate employees or warn them immediately after the spill, court records show. [Lancaster. The Orlando Sentinel, p. D-7, Apr. 23, 1986.]

April 23: A series of computer-enhanced photographs showing the Challenger's intact crew cabin tumbling through the sky seconds after the Jan. 28 explosion were released by NASA. The photos distinctly show the crew cabin's outline and windows as it plunged more than nine miles into the Atlantic Ocean. It is not known if the crew died immediately after the explosion or as the cabin hit the ocean at speeds of 140-180 mph.

In a prepared statement also released, NASA said there is not enough detail in the photographs to determine how much of the cabin was damaged in the explosion. Investigators are continuing to examine the photographs and other evidence to determine the condition of the crew cabin after the shuttle exploded. The cabin was discovered by divers March 7 in less than 100 feet of water some 20 miles east of Kennedy Space Center. [Lafferty. Florida Today, p. 1A, Apr. 24, 1986.]

April 24: Lt. Gen. Forrest McCartney, Commander of the Space Division of the Air Force Space Command, told the 23rd Annual Space Congress that he was "disappointed" in the recent failures in the shuttle and Titan rocket programs, but he hasn't lost faith in either program. "I have no reason to believe that there is any better hardware in the world than our expendables and our shuttles," he said. "We really don't know what happened [in last week's Titan rocket explosion at Vandenberg AFB], and we're working very hard to find the cause and fix it," he said. [Halvorson. Florida Today, p. 2A, Apr. 25, 1986.]

<> A GOES weather satellite was mounted atop a Delta rocket early this morning at Kennedy Space Center as NASA prepares for its first launch since the Challenger disaster Jan. 28. Spokesman George Diller said the operation went smoothly and tests would continue today. Launch is set for May 1. A problem with part of the mechanism that couples the satellite to the rocket's third stage delayed the mating for one day, Diller said. ["Weather Satellite Mounted Atop Rocket," Florida Today, p. 2A, Apr. 25, 1986.]

April 28: Technicians at Kennedy Space Center unstacked one unused solid rocket booster and prepared to start on another as NASA continued searching for clues to the cause of the Challenger disaster. Unstacking of the second booster is expected to be complete by May 15. [Lafferty. Florida Today, p. 4A, Apr. 29, 1986.]

April 29: A convoy of seven hearses and NASA security vehicles carried the seven Challenger astronauts on a ten-mile trip from the Life Sciences Facility at Cape Canaveral Air Force Station to the shuttle runway at 9 a.m. It was thirteen weeks exactly after the 51-L tragedy. Hundreds of KSC employees stood silently, lining portions of the convoy route; the silence continued after the convoy arrived at the shuttle runway. On hand were a large contingent of NASA and military personnel, including an honor guard and astronauts escorting the seven flag-draped coffins. Present at the runway ceremony were shuttle chief Richard Truly, former shuttle chief Jesse Moore who now heads Johnson Space Center, and chief astronaut John Young. Air Force pallbearers took each casket from a hearse and placed it aboard the C-141 jet which took them to Dover Air Force Base in Delaware two and a half hours later. [Lafferty. Florida Today, p. 1A, April 30, 1986.]

<> The seven hearses that carried the remains of Challenger's astronauts to a military jet were supplied by funeral homes or delivery services in Central Florida and as far away from Kennedy Space Center as Clearwater, Florida. As part of the plan, the hearses met at 5 a.m. at South Brevard Funeral Home (Melbourne, FL), which has a contract with Patrick Air Force Base. The seven vehicles were escorted by sheriff's motorcycles to Cape Canaveral Air Force Station at 6 a.m.

Once at the hangar where the remains were kept, the drivers were briefed and their hearses assigned numbers to correspond with the astronauts. The gray coffins were affixed with the appropriate number and the crew member's last name, and each was draped with a flag as it was loaded into a hearse by an honor guard for the 8-mile trip to the runway. [Fisher. The Orlando Sentinel, p. A-16, Apr. 30, 1986.]

<> The long-sought piece of Challenger's right solid rocket booster was recovered, but some of its critical elements were missing, NASA announced. The 6-foot-tall, 10-foot-wide piece of wreckage once held O-rings. Neither O-ring residue nor the U-shaped device called a clevis, which held the seals, were recovered, said NASA spokesman Hugh Harris. The clevis appeared to have been burned away or broken off, he said.

The one-ton piece of booster had a 33-inch-long hole that looked as though it had been caused by the leak, officials said. The debris - removed from 600 feet of water some 35 miles offshore - was identified through serial numbers, NASA spokeswoman Lisa Malone said. A matching piece from the booster segment just above the bottom segment was recovered April 13.

Challenger accident investigators said that burned-through piece provided no new evidence but did substantiate some existing theories about why the shuttle was destroyed. Recovery of the latest piece of wreckage prompted NASA to call off the search for booster debris in deep water, officials said. Several vessels participating in deep-water recovery operations will be released from search operations soon. Efforts to recover shuttle debris thought to be in shallow water will continue, however. [Lafferty. Florida Today, p. 4A, Apr. 30, 1986.]

May 1: NASA decided to scrub the 6:18 p.m. launch of a Delta rocket carrying a GOES weather satellite after engineers found rocket fuel in the first-stage had leaked from the main engine valve. "We're never disappointed to find these things before we fly," NASA spokesman Hugh Harris said. "This is what tests are for - to find any problems." About a quarter cup of highly refined kerosene dripped onto a portion of the first-stage engine and possibly onto fuel lines that must remain dry until launch, NASA spokesman George Diller said. "There was no chance of an explosion...there was concern that the rocket could lose thrust." Launch managers, concerned about overworking ground crews, decided to wait until May 2 to begin purging and cleaning fuel lines. "Rather than take a chance of not getting full performance (from the first-stage), we decided to let those lines dry," Diller said. If the valve continues to leak, the replacement could take up to ten days. [Lafferty. Florida Today, p. 1A, May 2, 1986.]

May 2: The launch of an unmanned Delta rocket carrying a GOES weather satellite was rescheduled for May 3 at 6:18 p.m.; the launch window extended till 7:17 p.m. "We believe we had a seal in the main-engine fuel valve that was not fully seated," said George Diller, NASA spokesman. Engineers believe the seal seated itself when the fuel was pressurized May 1 before being loaded. Two more leak checks were scheduled to be performed before the May 3 launch. [Lafferty. Florida Today, p. 1A, May 3, 1986.]

May 3: A Delta rocket and its GOES weather satellite payload were intentionally destroyed less than two minutes after launch when the rocket's main engine abruptly shut down, causing the spacecraft to veer wildly out of control. The main engine shut down 71 seconds into flight after six of the nine solid rocket boosters had been jettisoned. The remaining three boosters had just ignited when the rocket's liquid-fuel main engine failed 10.3 miles above the Atlantic Ocean.

The nose of the rocket quickly broke up as the Delta turned sideways and tumbled at 1,407 mph. A range safety officer from the Eastern Space and Missile Center at Patrick Air Force Base sent a signal 20 seconds later to destroy the Delta. The rocket's pieces fell 15 miles into the ocean, 30 miles from Cape Canaveral, FL. Navy officials said they had no idea what caused the usually reliable Delta to fail - only the 12th failure in 178 launches dating back to May 13, 1960. The first successful Delta launch was Aug. 12, 1960, and it orbited NASA's first communications satellite, ECHO-1. [Glisch. The Orlando Sentinel, pp. A-1 & A-16, May 4, 1986, and "100th Successful Delta Launch, May 7, 1975," p. 3, The Office of Public Affairs, NASA, Goddard Space Flight Center, Greenbelt, Maryland.]

May 4: An eight-member panel was appointed to investigate the unexplained shutdown which led to the destruction of May 3rd's Delta launch. Lawrence Ross, Director of Spaceflight Systems at NASA's Lewis Research Center, will lead the investigation. He arrived today at Kennedy Space Center to meet with those involved in the launch. Six other NASA officials and an Air Force representative also were appointed to the team by Rear Admiral Richard Truly, NASA's Shuttle Director and Associate Administrator for Spaceflight. The panel was given a July 2 deadline to report on the accident and recommend "corrective action." [Lafferty. Florida Today, p. 1A, May 5, 1986.]

May 5: Engineers disassembling a solid rocket booster stack at Kennedy Space Center to search for clues to the Challenger accident discovered that holes are created in the booster's internal putty by a test process used at Kennedy prior to Jan. 28. The finding indicates the test process created a condition inside the booster joints that could allow hot, high-pressure gas more easily to reach joint seals. [Covault. Aviation Week & Space Technology, p. 21, May 5, 1986.]

<> NASA officials said that an electrical short circuit may have caused the engine shutdown that led to the destruction May 3 of a Delta and its weather satellite cargo. Delta manager Bill Russell said technicians found evidence of a short circuit eight-tenths of a second before the first-stage engine shut off, causing the rocket to gyrate wildly out of control and necessitated its destruction 91 seconds into the flight. Investigation panel chairman Lawrence Ross

said the Delta accident made it unlikely that the Atlas-Centaur launch scheduled for May 22 will occur as planned. "There's a fair probability it will be delayed, unless we can find the cause (of May 3's malfunction) very quickly," Ross said. [Heller. Florida Today, p. 1A, May 6, 1986.]

<> Kennedy Space Center celebrated the 25th anniversary of America's first manned launch. Tape recordings from the flight of Alan Shepard in Freedom 7 were played at the launch site; Shepard sent his thanks in a telegram from Los Angeles where he and four of his Mercury colleagues were attending a celebration. Standing in for Shepard at KSC was astronaut Bob Crippen who said: "A wise man once said the longest journey begins with the first step. Many of you gentlemen took that first step. The journey was a trip to the stars. We have a way to go. Thanks to you, we're on our way." Referring to NASA's recent launch failures, he said, "It's rare to win without some losses. We like to feel we're infallible. We're not. We proved that on Jan. 28 and underscored it this past Saturday [May 3]. We'll learn from our errors. When we fly again - and we will - it will be in a stronger, safer vehicle."

KSC Director Dick Smith spoke of the same determination to succeed. "A lot of you remember we had a lot of problems in the early days. Still, you were shocked, we were shocked (by the recent failures). Perhaps we'd become a little complacent. We all know we're on the front edge of technology. A lot of things can happen; a lot of things can go wrong." [Heller. Florida Today, p. 5A, May 6, 1986.]

<> Four pieces of debris from the Delta rocket which was destroyed May 3 washed ashore in Cocoa Beach and Satellite Beach today, a Kennedy Space Center spokesman said. A control box from the GOES weather satellite was discovered about 10:30 a.m. floating near a Cocoa Beach hotel, and three rocket hemisphere tanks for fuel and nitrogen were discovered later in the morning near Patrick Air Force Base, Air Force Lt. Col. Bob Nicholson said. Michael Borsof, manager of the Beach Island Resort, reported finding the control box during his daily rounds at the hotel and recognized its importance from an inscription reading "GOES Triflex Filter." [Miller. Florida Today, p. 5A, May 6, 1986.]

May 6: Kennedy Space Center Director Dick Smith expressed pleasure on hearing the news that the U. S. Senate had confirmed former NASA Administrator Dr. James Fletcher by a vote of 89-9 for a second term as head of the space agency. "I'm very pleased," Smith said. "I've been a supporter of Dr. Fletcher's since before the nomination. I'm happy to see him back and look forward to working with him again." [Heller. Florida Today, p. 6A, May 7, 1986.]

May 7: The apparently faulty engine that shut down on the Delta rocket launched May 3 was found 30 miles off the coast of Cape Canaveral, according to an official of the research foundation assisting in the recovery effort. NASA spokesman Dick Young said he was unable to confirm the report. In a related development, NASA delayed for a month the planned May 22 launch of an Atlas-Centaur rocket. Its first-stage engine closely resembles the suspect Delta engine. Officials wanted more time to examine the rocket. [Heller. Florida Today, p. 3A, May 8, 1986.]

<> NASA opened competition for the third in a series of Kennedy Space Center contracts that would consolidate several contracts and would mean up to 15 years of multimillion dollar income for the award winner. The contract would cover all payload ground work and includes preparing satellites and Spacelab experiments for launch on the shuttle as well as the operation, maintenance and engineering of related processing operations at the space center, said George Diller, NASA spokesman.

The major provider of these services and a bidder for the contract is McDonnell Douglas Astronautics Co. of St. Louis. NASA said the company's last two-year extension was valued at $61.9 million. The payload contract would bring under one direction work being done by McDonnell Douglas and Boeing Aerospace Operations of Cocoa Beach, Computer Sciences Corp., EG&G Florida Inc. and Planning Research Corp. The contract will involve about 1,000 workers, NASA said. [Hinman. The Orlando Sentinel, p. A-15, May 8, 1986.]

May 9: The slowdown in programs resulting from the Challenger disaster caused Martin Marietta to lay off 24 workers at Kennedy Space Center, though many of these were transferred within the company, an official said. The layoffs at Marietta's solid rocket booster

parachute facility are "a direct result of the slowdown in the shuttle program," said Bob Gordon, public relations manager. [White. Florida Today, p. 2A, May 10, 1986.]

May 13: Air Force Col. Edward O'Connor said lessons learned in the lengthy recovery of Challenger debris sped up efforts to salvage the suspect main engine components of the failed Delta rocket which exploded May 3. Those same lessons provided the knowledge needed to develop a computer program which will enable authorities better to track down spacecrafts, aircrafts or satellites falling from orbit back to Earth. [Halvorson. Florida Today, p. 6A, May 14, 1986.]

<> Creighton Terhune, director of payload management and operations at Kennedy Space Center, will head a panel on launch and flight data collection for the board investigating the May 3 explosion of a Delta rocket. ["Delta Panel Targets 8 Areas in Investigation," Florida Today, p. 6A, May 14, 1986.]

May 16: NASA managers were not listening to open radio channels when contractor engineers warned that launching Challenger was "a bit of Russian roulette," said Horace Lamberth, Kennedy Space Center's director of shuttle engineering. He said, further, that managers were not told about a potentially dangerous sheet of ice between the astronauts and the escape system they would use in case of a launch pad emergency.

The ice problem would have prompted discussion possibly ending in a scrub, said Lamberth, who was involved in pre-launch ice conversations. Lamberth's remarks followed NASA's release of transcripts of radio transmissions recorded the morning of the Challenger tragedy. The transcripts were taken from 10 radio channels used before the launch by NASA and contractor officials. [Lafferty. Florida Today, p. 1A, May 17, 1986.]

May 17: William R. Harris, 57, NASA's chief of contract administration at Kennedy Space Center, died at Cape Canaveral Hospital (Cocoa Beach, FL). Harris had worked for NASA for 25 years in the procurement office. ["William Harris, 25-Year NASA Veteran, Dies," Florida Today, p. 12A, May 20, 1986.]

May 19: NASA and its contractors initiated systems improvement programs at Kennedy Space Center to update, streamline and standardize shuttle processing operations and to eliminate hardware and procedural deficiencies. Some of the deficiencies were long standing and some were uncovered in the course of reviews and investigations resulting from the Challenger accident. Government and industry leaders said the current work corrects shortcomings and makes the processing system more time and cost efficient. They said, further, that previous procedures had not contributed to the 51-L disaster, but that they had needed improvement.

Many of the work items under way had been relegated to a low priority because shuttle turnaround and launch schedules were so tight that there was no opportunity to fix them. The most significant areas involved: documentation and record keeping, maintaining and upgrading ground support equipment and facilities, modifying and testing orbiters, and training and recertifying the entire management, engineering and technician workforce. [Kolcum. Aviation Week & Space Technology, p. 54, May 19, 1986.]

May 20: Atlantis and Discovery swapped places at Kennedy Space Center; Atlantis moved from the Orbiter Processing Facility to the Vehicle Assembly Building and Discovery took the reverse route, said NASA's George Diller. At the VAB, technicians currently are stacking two solid rocket boosters that eventually will be joined by an external tank and then Atlantis. Officials hope to move the shuttle "stack" to a launch pad during the last week of June, Diller said. At the pad, a Centaur rocket would be placed inside the payload bay, along with the spacecraft or a mock-up. [Lafferty. Florida Today, p. 7A, May 21, 1986.]

May 21: NASA found "no direct evidence" that divers involved in the recovery of Challenger's crew compartment kept personal belongings of the seven astronauts as souvenirs, officials said. Kennedy Space Center security officer William Riddle said, "We have no direct evidence that anybody kept any items that were of a personal sort. The only evidence we have is what a sailor said to a girl in a bar." Lt. Cmdr. Joel Keefer, USS Preserver, said, "There was no evidence that any Preserver crew member had any shuttle debris in [his] possession." [Halvorson. Florida Today, p. 1A, May 22, 1986.]

May 23: The Pentagon named Col. Jon Mansur as the new commander of the Eastern Space and Missile Center beginning June 25. The missile center, which includes Patrick Air Force Base and Cape Canaveral Air Force Station, provides support for shuttle and unmanned rocket launches. [Glisch. The Orlando Sentinel, p. D-1, May 24, 1986.]

<> A 35-foot-long tank from the Delta rocket which failed shortly after launch on May 3, was discovered less than a mile away from where the main engine was found, NASA officials said. Divers from the Navy salvage ship USS Opportune found the tank 32 miles east of Kennedy Space Center in 150 feet of water, NASA spokesman George Diller said. Spokeswoman Lisa Malone said that divers are "looking for some electronics boxes that control certain events during the launch and during the flight, wiring and any hardware having to do with the engine." [Federbusch. Florida Today, p. 6A, May 26, 1986.]

May 24: NASA's launch rules are "going to be revised from top to bottom," said Bob Sieck, NASA director of shuttle operations at Kennedy Space Center. He predicted the new policies will lead to a more conservative approach than the one that allowed Challenger to lift off Jan. 28 in the coldest weather for any shuttle launch. Three changes being considered from among 3,000 launch commit procedures are: making weather constraints tougher, announcing over an inhouse radio network the launch decisions made by contractors during the countdown and these decisions would be tape recorded, and involving more people in the formal launch decision. One of the key changes under consideration, Sieck said, would stop managers from basing part of their launch decision on the temperature at liftoff time. That single factor would be replaced by looking "at the previous trend for the past 24, 36, even 72 hours," Sieck said. [Tracy. The Orlando Sentinel, pp. A-1 & A-15, May 25, 1986.]

May 29: About 100 Kennedy Space Center workers may have been swindled along with another hundred persons in Orange County, FL; the money lost was $2.18 million. In a civil suit filed in Orange County Circuit Court, Florida Comptroller Gerald Lewis charged Inter-American Business Consultants and Associates and two company officials with violations of Florida's Securities Law. Included in the charges were sale of unregistered securities, sale of securities by an unregistered

dealer and fraudulent sale of securities. [Williams. Florida Today, p. 1A, May 30, 1986.]

<> Up to 90 Boeing Aerospace Operations employees were scheduled to be laid off or transferred because of the shuttle and Titan disasters, a Boeing official said. The cuts represent 50 percent of Boeing's 180-member workforce under an Air Force contract to service rocket boosters that lift payloads into high altitude orbits, according to Boeing spokeswoman Leslie Neihouse. [Lafferty. Florida Today, p. 1A, May 30, 1986.]

<> A satellite from Challenger's payload bay that has eluded salvors since the 51-L accident in January was found earlier this week, said Air Force Col. Edward O'Connor, head of salvage operations. Working in about 70 feet of water 16 miles offshore, divers found the wreckage of the Spartan-Halley spacecraft which was to have deployed for study of Halley's Comet. O'Connor said finding the spacecraft was important to show engineers weaknesses in the spacecraft and how similar spacecraft can be made stronger. He also said he expects salvage operations to continue through June using NASA's two solid rocket booster retrieval ships. Divers continue looking for portions of the TDRS, he said. [Lafferty. Florida Today, p. 2A, May 30, 1986.]

<> Atlantis and two solid rocket boosters were moved to different areas of the Vehicle Assembly Building at Kennedy Space Center in preparation for the first shuttle "stacking" since the Challenger tragedy. ["Atlantis, Boosters Shuffle for Stacking," Florida Today, p. 2A, May 30, 1986.]

May 31: Gaps were found in the protective putty of a solid rocket booster that was reshaped in the same manner as was Challenger's failed booster. The problems were discovered in an unused booster that was unstacked at Kennedy Space Center in late April as part of the Challenger accident investigation. [Lafferty. Florida Today, p. 1A, June 1, 1986.]

June

June 2: Hundreds of Kennedy Space Center employees were late to work when the drawbridge on SR 401 in Cape Canaveral was stuck open. A barge carrying a crane knocked down a power line next to the bridge, causing the bridge to stick in the up position. The drawbridge was open for about an hour before an emergency generator was able to lower the first of the three movable bridge segments, a bridgetender said. [Cason. Florida Today, p. 5A, June 2, 1986.]

<> NASA officials fear that a proposed tax reform law could trigger the retirement this month of hundreds of the agency's most experienced workers, including many top executives at Kennedy Space Center. Kennedy Comptroller Joseph Malaga, 56, retired May 30, to avoid paying nearly $25,000 in extra taxes because of the possible change. "That was the only reason I retired," Malaga said. "My plans were to work until at least the middle of 1988. Leaving NASA is one of the hardest things I've ever had to do, particularly now. But it's not worth losing $25,000." Believing he was forced to retire, Malaga said, "I feel I have worked in good conscience for over 35 years. To change the rules now as Congress proposes, to me, is just unconscionable." [Fisher. The Orlando Sentinel, p. A-1 & A-4, June 3, 1986.]

June 3: Carver Kennedy, Morton Thiokol Inc.'s vice president for space services at Kennedy Space Center, was named to head the company's solid rocket booster program in Brigham City, Utah, officials said. Kennedy says he realizes that the booster program will be under intense scrutiny while the joint is being redesigned, work that is already underway. "We're going to get it fixed and get it flying again," said Kennedy, who had been in charge of Morton Thiokol's KSC operation since 1983. [Halvorson & Lafferty. Florida Today, pp. 1A & 2A, June 4, 1986.]

<> Brevard Community College will receive $300,000 in federal funds to help laid-off workers from Kennedy Space Center find new jobs, the U. S. Department of Labor said. The amount is about 40% less than the college asked for, but Joe Keller, the school's dean for instructional advancement, said BCC would try to

offer as much of the assistance as it had planned to do. [Perez. Florida Today, p. 1A, June 4, 1986.]

<> U. S. Rep. Bill Nelson (D-Melb., FL) said it's clear NASA will undergo organizational changes because of the Challenger accident and that if more NASA personnel are needed to insure safety, he would support the buildup. "I think this disaster is going to demand that the agency be run by Dr. [James] Fletcher" from NASA headquarters in Washington without as much autonomy as individual NASA centers enjoyed in the past, said Nelson, chairman of the House Space Science Subcommittee. [Mecham. Florida Today, p. 9A, June 4, 1986.]

June 5: Robert J. Wydra, an electrical lineman for EG&G, was in stable condition at Jess Parrish Memorial Hospital (Titusville, FL) after suffering second- and third-degree burns on his right arm from an apparent power surge. He was working at the Banana River Repeater Station 1 near Kennedy Space Center when he was shocked, said NASA spokesman George Diller. EG&G appointed an internal investigation board, said company spokeswoman Debbie Marth. [EG&G Worker Burned in Power Surge," The Orlando Sentinel, p. D-8, June 6, 1986.]

June 8: Shuttle processing workers at Kennedy Space Center ratified a new contract 297-20 with Lockheed Space Operations Co., averting a possible strike. The new contract gives employees wage and benefit increases during the next three years. It is retroactive to June 1 and expires May 31, 1989. [Mittman. Florida Today, p. 1A, June 9, 1986.]

<> Astronaut Kathryn Sullivan defended NASA against blame for the SRB failure in the Challenger accident during a press interview at Kennedy Space Center. Sullivan had just addressed the opening day at KSC of the second annual NASA-University Advanced Design Conference. "I don't believe (NASA) management was informed," she said. "It was a problem in communications and perception."

Sullivan, who took an historic space walk during Challenger's October 1984 mission, said if NASA asked her to take another shuttle flight right now, she would turn them down because "we're not ready to fly." She also said the astronauts understood the dangers

attendant to shuttle flights. "It's an experiment every time we fly it," she said. "It's not the 747 yet. The current shuttle will never be the 747."

Sullivan downplayed conflicts between the astronauts and NASA management, though she called for more astronaut input into NASA decision-making. "Operations need to be closely synchronized with the astronauts. This should not be misconstrued that there is a rift between the astronauts and the rest of the agency (NASA), because that is not the case." [Booth. Florida Today, p. 7A, June 19, 1986.]

<> Calling it "an accident rooted in history," the Challenger commission blamed the Jan. 28 shuttle tragedy on a faulty booster rocket joint that went unfixed for years by a bureaucracy buckling under the pressure of an unrealistic flight schedule. NASA was trying to do too much with too little, leading autonomous middle level managers to sweep under the rug critical safety concerns that were a threat to the lives of the astronauts, the panel concluded in its report to President Reagan. [Smart & Reidy. The Orlando Sentinel, p. A-13, June 10, 1986.]

<> The Challenger commission strongly recommended against further landings at Kennedy Space Center until NASA "installs and tests an improved braking system." NASA, shuttle manufacturer Rockwell International and the B. F. Goodrich Co. are already negotiating for an improved system, and hope to have a redesign started next month.

The commission's report said: "The tire, brake and nosewheel steering systems must be improved. The specific conditions under which planned landings at Kennedy would be acceptable should be determined. Until the verified systems meet those criteria in high fidelity testing that is verified at Edwards [Air Force Base, CA], landing at Kennedy should not be planned. Committing to a specific landing site requires that landing area weather be forecast more than an hour in advance. During unpredictable weather periods at Kennedy, program officials should plan on Edwards landings." [Lunner. Florida Today, p. 2A, June 10, 1986.]

<> Sam Beddingfield, former deputy director of shuttle projects management at Kennedy Space Center, said the Rogers Commission recommended some nearly impossible changes in the shuttle program. "I think the commission did a good job of digging down to the heart of the matter," he said. It would be difficult, he added, to implement the recommendation that the shuttle be able to separate itself from the fuel tank and land on its own in case of an explosion.

"That will be almost impossible to do, because you just can't get off the external fuel tank that easily. That one I don't see that there's any way to do." Beddingfield said the report clearly shows why the Challenger failed and how the tragedy could have been avoided. "It didn't have a whole lot of surprises in it. I would say one of the major things about the report is that it points out that the real problem had been a problem for a very long time. It shows that Thiokol knew the problems with the joint for a long time and didn't fix it," he said.

"Like Dr. Fletcher said, I would also say there's a lot of blame to go around," Beddingfield said from the Washington, D.C., hotel room where he spent most of the day reading the report. "But I think NASA will be a better agency once it implements the recommendations. From here, the real crux of the matter will be how Congress supports these recommendations with dollars," he said. [White. Florida Today, p. 3A, June 10, 1986.]

June 10: The Atlantis is now in the transfer aisle of the Vehicle Assembly Building at Kennedy Space Center waiting to be joined with its external fuel tank and solid rocket boosters June 16, according to George Diller, NASA spokesman. Rollout for Atlantis to Launch Pad 39A is scheduled for June 25. At the pad the orbiter will undergo mechanical and electrical tests of ground support equipment for the Centaur booster it is scheduled to carry in its payload bay, Diller said. ["Shuttle Atlantis Awaits Tank, Booster Mating," Florida Today, p. 3A, June 11, 1986.]

June 11: NASA spent nearly $1.5 million on the care and feeding of members of Congress and other VIPs flown to Kennedy Space Center to watch the liftoff of the first nine shuttle flights, according to a General Accounting Office study completed in 1984. NASA officials said

the agency maintains the practice of flying government officials to Cape Canaveral to view launches, although on a reduced scale. ["VIP Treatment Rings Up $1.5 Million Bill," Florida Today, p. 2A, June 12, 1986.]

<> President Reagan expressed a desire to build a replacement orbiter for the Challenger in his news conference in Washington, but wondered if money were available. He added that pressure to get cargo to space on unmanned rockets could mean delays in finding the money for a shuttle. "I want to go forward...with the shuttle program," he said. "But there is a backlog of space cargo that is supposed to be up there."

Kennedy Space Center spokesman Hugh Harris had no official comment on the president's remarks because "the president didn't really give any definite plans about what he wanted to do. He was very supportive about the shuttle program, and that is bound to make a lot of people happy. But he really didn't say exactly what he was going to do, or when he was going to do it."

Reagan also offered his own explanation for the Challenger tragedy: the balmy weather in Florida. "I've often wondered this," he said, "if part of it wasn't due to the balmy climate of Florida and that it was difficult for anybody to believe that they'd had a cold snap that could render that O-ring dangerous." [Neuman & Adams. Florida Today, p. 1A, June 12, 1986.]

<> Withholding information about the Challenger explosion from the media was a mistake NASA won't make again, top managers said at Kennedy Space Center. "I think the bottom line is trust," said Bob Sieck, shuttle operations chief. "Relationships are based on trust, and in my opinion, a minority of the press eroded the trust that was there. There was some trust between NASA and the media, and a minority of the press eroded it.

"There wasn't a free flow of data, and the coverage, as a result, wasn't totally accurate, and we both suffered," Sieck said. "The media reputation got to be that it wasn't fair and impartial, and it was biased. And the NASA reputation was that we're hiding something. There's a lot of support for this program in this country. There's a lot of interest in it, and

<> those people out there want to know what's going on. And we owe it to them to tell them. I wouldn't be here today if I didn't think that was the case."

NASA officials withheld key facts and film evidence surrounding the accident that killed seven astronauts until reporters learned of the data through leaks. Even the fact that a solid rocket booster had leaked flame during the liftoff, clearly visible in NASA films and video, was withheld for days. "The concern was, 'Well, somebody will reach a premature conclusion' based on the plume or the flume," Sieck said. "They'll get cause and effect confused and the media will end up running this investigation for us." He now concedes that premature conclusions were drawn anyway. "I think it's very important that we restore the relationship - in fact, improve upon what it was before the accident - between NASA and the media," said Sieck.

KSC Director Richard Smith, who earlier took both the media and the Rogers Commission to task for what he believed were premature disclosures, said his position has mellowed. "Yeah, I complained about the press a little bit," Smith said from his office overlooking a skyline dotted with empty launch pads. "My problem with the press was frankly, a lot of people who were new to the business. Yeah, I agree that NASA should have been more forthright with some of the information and so forth."

As to his early criticism of the commission's release of data before it concluded its investigation, Smith said his complaints involved timing. "Well, I think my comments were made at a time when it was not, at that point in time, not completely obvious that the failure was necessarily the joint in the motor," Smith said. As to the Rogers Commission report, Smith said: "I'd say overall it's pretty comprehensive. No big surprises." [Lunner. Florida Today, p. 2A, June 12, 1986.]

<> Kennedy Space Center officials believe they can handle 12 or more launches a year once the space shuttle program is back on line. Provided the money, resources and personnel are available, they say each of the remaining three shuttles should be able to complete four or five flights a year.

Shuttle operations chief Bob Sieck and KSC Director Richard Smith presented an upbeat attitude regarding resumption of shuttle operations. "Launching at a very slow rate does not ensure safety," Smith said. "Of course, launching at a rate that is too fast and overworks people also doesn't ensure safety. You should launch at as rapid a rate as you can that keeps high morale." Said Sieck: "We've found that you get the best product if you do provide an incentive to the work force. Give them a goal, give them something to reach for, and they approach it much more aggressively and you get a better product."

"Yes, we've got to watch the overtime," said Sieck. "Yes, we've got to beef up our management system to keep an eye on the workload for the critical skills area. But we shouldn't just approach the future flight rate as 'slower is safer' from the standpoint of workload."

Sieck, who has been with NASA since 1964, when he was hired as a Gemini spacecraft systems engineer, is in charge of preparation, launch, recovery and refurbishment of shuttles. He was at a console in the launch control center when Challenger exploded Jan. 28.

Both Smith and Sieck seem undaunted by criticism that the space agency had tried to fly shuttles too frequently. "[It] comes out [in] the (Rogers Commission) Report a number of times that we were unrealistic, possibly too bullish on our approach to the manifest," Sieck said, using NASA's word for "launch schedule." Of KSC's relationship with its prime processing contractor, Lockheed Space Operations Co., Sieck said: "My assessment is: It works - needs improvement."

Sieck singled out improved...work documentation systems, better training and better work scheduling to avoid massive overtime. He said Lockheed had improved quality control systems and predicted those areas will become stronger. The operations chief said he expects to find ways to shorten turnaround time at the Edwards Air Force Base landing site in California that the Rogers commission recommends using until better steering, brakes and landing conditions are available for KSC landings.

Smith said the commission's landing suggestion was nothing new. "We had already decided...we were going to get that system fixed before we started routinely landing here. I think, in the program, there is still the thrust and desire to, as soon as we can, get back to where we should be landing - here. Clearly, we're always going to have a problem with the weather in Florida. I think we can improve the weather forecasting, and we're working on that."

Sieck said he would expect to handle 12 or 13 missions a year under the revised guidelines. "Probably closer to 13, if they're all landing at Edwards," he said. "If we can work in a few at Kennedy, then you can keep working back up to what I call the optimistic goal of 15." Smith later agreed that KSC can readily process four flights a year on each remaining orbiter, if funding is forthcoming. But he said the first year will see a conservative, perhaps four-flight schedule. Many of the delays KSC experienced trying to meet earlier schedules stemmed from such problems as a serious lack of spare parts, which led to taking them from other orbiters, a time-consuming process, both agreed. Smith said switching parts from orbiter to orbiter also increases the risk of wear and damage. "It's not the right way to run a railroad."

Smith said the problem should be solved by the transfer to KSC of spare parts management, which Johnson Space Center Director has agreed to relinquish. "I think that's appropriate," Director Smith said, "because the user is the one most acutely aware of the need for the tools or the parts, or whatever. He suffers when they're not there.

"We haven't magically made money available" for the required changes, Smith said. "I think the emphasis made in the commission's report will help make the system aware of this. Granted, that whenever you wind up with x-amount of money you can spend in a year, you always have to make some priority choices. And I would be naive to think that KSC will get everything we'd like to have on our priority list when compared to everybody else. But I expect to get a fair hit.

"Yes, we had an accident. But I think coming out of this will be similar to what happened after the Apollo fire (which killed three astronauts on the launch pad in 1967). The agency came out of it stronger and

better, and probably that guaranteed the safe lunar landing and return. I think a couple of years from now, we'll have the same story to tell," Smith said. "That the agency and the space program will be stronger and better." [Lunner. Florida Today, p. 2A, June 12, 1986.]

June 12: The tons of Challenger debris recovered from the Atlantic Ocean will probably be stored indefinitely, NASA officials said. "For probably the better part of this year, it's going to be kept in a condition where people who have a legitimate need to study it can use it," Kennedy Space Center spokesman Hugh Harris said. After that, he said, "Long-term storage is most likely, though that decision hasn't been made." Wreckage of the Challenger's crew cabin was off limits to the press for the present. "I would expect you will be seeing it sometime in the future," KSC spokesman Harris said. [Lafferty. Florida Today, p. 9A, June 13, 1986.]

June 17: Lt. Col. R. Curtis Graeber, a member of the presidential commission on the shuttle disaster, said it and other air tragedies might have been averted if more attention had been paid to human limitations. Graeber, a research psychologist with NASA, said his examination of over 40,000 workers' time cards showed that many people preparing for the shuttle mission were suffering from overwork at the time of the accident. Many employees were working 72 hours a week, frequently in 12-hour shifts, he said, because of pressure to launch the Challenger. Graeber said retirements, hiring freezes and transfers contributed to the burden placed on workers. ["Human Limitations Tied to Tragedy, NASA Psychologist Says," Florida Today, p. 5B, June 18, 1986.]

June 20: United Space Boosters Inc. intends to lay off 120 workers due to delays in the shuttle program, said USBI spokeswoman Kathy Mason. The workers are involved in the processing and refurbishment of the shuttle's solid rocket boosters. In January, USBI announced the immediate layoff of about 50 employees. Edward Kolcum, a senior editor with Aviation Week & Space Technology magazine said more KSC layoffs are inevitable unless NASA can stick to its timetable to launch July 28, 1987. "They're getting to the point where they're going to have to furlough more and more people as they complete the work while the shuttle launch is stymied," Kolcum said. [Booth. Florida Today, p. 1A, June 20, 1986.]

<> The Centaur upper stage engine was banned from future shuttle flights because NASA managers feared that the engine's thin-walled pressurized liquid hydrogen and oxygen fuel tank presented too great a safety risk, agency officials said. NASA leaders reviewed the risks posed by carrying Centaur aboard the shuttle at a special meeting June 19. The decision not to fly the Centaur engine causes a further interruption to NASA science missions and Air Force payloads. [Fisher. The Orlando Sentinel, p. A-1, June 21, 1986.]

<> The launch site for a secret military shuttle mission may be moved to Kennedy Space Center, a NASA official said. Mission 62-B was expected to launch the first of a new generation of Department of Defense satellites. Bob Sieck, director of shuttle operations at KSC, said officials are concerned about "how much coverage you get with a safe trajectory" from Kennedy Space Center. ["Military May Move Shuttle Launch to KSC," The Orlando Sentinel, p. A-8, June 21, 1986.]

June 22: Members of local unions representing federal workers at Kennedy Space Center, Patrick Air Force Base and the General Services Administration at KSC were among those attending a family picnic at Merritt Island's KARS Park. John Sturdivant, vice president of the American Federation of Government Employees, spoke to the attendees on issues of concern to the union in Washington.

Sturdivant said afterward that the picnic was intended to boost spirits in the wake of the Challenger accident and subsequent investigation. "It's an opportunity to get the federal workers together and boost their morale a little. As the (shuttle) inquiry moves into another stage in the effort to correct the problems, the federal workers will play an important role." [Willmore. Florida Today, p. 8A, June 23, 1986.]

June 23: Shuttle director Richard Truly said that NASA isn't sure it can launch a shuttle by its target date of July 15, 1987. "Until we really get an oversight committee on board, I don't think it will be helpful to set a new date," he told a group of 200 aerospace executives at a United States Space Foundation conference. "I'd like to get into position where we don't change the launch date every few years." Efforts to implement the Rogers Commission recommendations have been "in the works," Truly told the executives. He

said that "we may have cost threats to the schedule and schedule threats, but I assure you we won't have safety threats." [Kelly. Florida Today, p. 1A, June 24, 1986.]

<> Plans to move the space shuttle Atlantis to Kennedy Space Center's Launch Pad 39A for the purpose of testing the upper stage of a Centaur and a planetary probe were officially canceled. NASA spokesman George Diller said the tests were scrapped as a result of the space agency's declaration last week to terminate the Shuttle-Centaur program. ["Atlantis' Trip to Pad Canceled," Florida Today, p. 8A, June 24, 1986.]

June 27: The exact cause of the May 3 Delta rocket failure was not found by engineers investigating the accident, said Lawrence Ross, head of the inquiry. But any changes that are made would not be far-reaching nor "take the vehicle out of business for a long time," said Ross. The accident panel will report their findings July 2 in Washington to shuttle chief Richard Truly. The group spent the preceding weekend at Kennedy Space Center finishing the report. "We're still discussing the redundancy systems," said Ross.

June 30: Attendance at Kennedy Space Center's Spaceport USA climbed at a record rate in June to 215,000 for the month, according to the latest NASA figures. The figures represent the second highest attendance for June since the attraction opened to the public in July 1966, said NASA officials. In June 1972 - when Skylab was orbiting - the visitors center hosted 250,000 persons. An attendance figure of 1.1 million for the first six months of 1986 marks an 18.8 percent increase over the first six months of 1985 and is the highest growth rate in the attraction's history. ["Spaceport USA Attendance Soars," Florida Today, p. 16C, July 2, 1986.]

July 7: Thirty students from colleges across the USA are taking part in NASA's second Space Life Sciences Training Program, a six-week camp from June 9 to July 18 for young people interested in space applications of life sciences. Shuttle astronaut Byron Lichtenberg will discuss his 1983 shuttle flight with space camp students at one of NASA's science facilities at Kennedy Space Center on July 14. [Lafferty. Florida Today, p. 6A, July 8, 1986.]

<> NASA plans to roll out Atlantis to a launch pad for tests on a newly installed weather protection system, said Kennedy Space Center spokesman Jim Ball. The tests will involve a $3.3 million system of moveable doors and panels designed to keep rain, wind and hail from damaging the shuttle's sensitive thermal protection system, Ball said. Rollout to pad 39B will take place Aug. 5; Atlantis will return to the VAB seven weeks later. [Lafferty. Florida Today, p. 6A, July 8, 1986.]

July 8: "We believe it's very important - extremely important - to keep [the KSC] workforce intact if at all possible," said Kennedy Space Center's public affairs chief Chuck Hollinshead to a breakfast meeting of the Cocoa Beach Area Committee of 100. Hollinshead said the jobs of KSC workers are safe for now, unless NASA decides further to delay shuttle launches.

Hollinshead said NASA would have to reassess its shuttle workforce if the next launch is put off till 1988. Some 1,200 workers employed by shuttle contractors have already been laid off, transferred or retired since the Challenger accident. The current workforce numbers 14,900. "We have had some fairly major cuts in our workforce at KSC," the public affairs chief said. "If you add to that the fact that we have cut down on our overtime, then you're really talking about a payroll cut of 20 to 25 percent, and the community has definitely felt that. If you add to that the feeling of uncertainty that people have, then there has been a fairly dramatic impact on certain parts of the community." [Lafferty. Florida Today, p. 1A, July 9, 1986.]

<> Andrew Petro, Jr., 52, a deputy director of engineering for Lockheed Space Operations Co. at Kennedy Space Center, died at Holmes Regional Medical Center (Melb., FL). Petro, a Brevard resident for 25 years, had worked at KSC for 24 years. ["Lockheed Deputy Engineering Director Dies at 52," Florida Today, p. 9A, July 9, 1986.]

July 10: Kennedy Space Center Director Richard G. Smith announced his plan to retire July 31 and his intention to take a position as president and chief executive officer of the General Space Corp. (Pittsburgh, PA). Speaking over the public address system and on closed circuit television to the center's 14,900 employees, Smith said leaving the space center now would give the new director time to become acclimated before the next shuttle launch. Ranking officials at KSC expressed disappointment on hearing of Smith's retirement.

"Personally, I feel I am losing a fine boss and a good friend," said John Conway, director of payload management and operations. "I've been very close to Dick and he told me he had been agonizing over this decision. I knew it was a close call."

Robert Sieck, KSC's director of launch operations, said, "I would consider it a loss in that he obviously leaves a big pair of shoes to be filled. Everybody here knew him and liked him. It's like we've added another cloud to the uncertainty that's been floating around here."

In a prepared statement, NASA Administrator James Fletcher said Smith's "leadership in running major space agency programs and directing the Kennedy Space Center through the advent of the space shuttle era will be sorely missed." Added Thomas Utsman, soon to be the acting director of KSC, "It's always going to be tough to replace someone of his caliber. I guess I was a little sad from a personal standpoint." [Lafferty. Florida Today, pp. 1A-2A, July 11, 1986.]

July 14: NASA officials confirmed that the next shuttle flight won't occur till early 1988 and that the workforce at Kennedy Space Center may suffer further layoffs. NASA Administrator James Fletcher said the solid rocket boosters could not be redesigned and developed in time to meet shuttle chief Richard

Truly's earlier launch objective of July 15, 1987. "Since we have moved (the target date back) a few more months, we are going to have to take a look not only [at] the Kennedy Center but across the system," Truly added. "But we also want to take care of our people, so we'll have to be looking at that right away." [Halvorson. Florida Today, p. 1A, July 15, 1986.]

July 15: Launch pad 34 is one of two at Cape Canaveral Air Force Station where NASA is considering building a facility to test the shuttle's redesigned solid rocket boosters in a vertical position, said Kennedy Space Center spokesman Dick Young. [Lafferty. Florida Today, p. 6A, July 16, 1986.]

July 17: George Meguiar, Spaceport USA spokesman, disclosed that the Kennedy Space Center attraction plans to open a $2.3 million exhibit next year that will provide visitors with a simulated walk through the nation's proposed space station and, from that vantage point, a look at the daily work of satellites. The exhibit was designed by Robert W. Kirchgessner (Orlando, FL) and is part of a five-year plan to upgrade Spaceport USA by its operator TW Services Inc. [Hinman. The Orlando Sentinel, pp. B-1 & B-6, July 18, 1986.]

July 22: The space shuttle Atlantis is scheduled to roll out to Pad 39B on August 19, a week later than planned, NASA spokesman Jim Ball said. Modifications of the launch pad designed to protect portions of the shuttle from weather damage have been nearly completed. [Lafferty. Florida Today, p. 7A, July 23, 1986.]

July 23: NASA delayed until November the launch of an unmanned Atlas-Centaur rocket. A U.S. Navy spokesman said the launch delay from its August 28 liftoff means that one of the military's most important communications systems will continue to depend upon a single satellite which had already outlived its expected life. Lawrence Ross, director of Space Flight Systems at Lewis Research Center (Cleveland, OH), said the delay was necessitated when NASA discovered some of the rocket's electrical components came from the lots that experienced high failure rates. NASA is now deciding whether those parts will need replacement before launch. [Halvorson & Lafferty. Florida Today, p. 1A, July 24, 1986.]

July 28: Lt. Gen. Forrest McCartney will be the next Kennedy Space Center director, according to the latest issue of Aviation Week & Space Technology. The trade publication correctly predicted the departure earlier in the month of current director Richard Smith. McCartney is presently in charge of the Air Force's Space Division in Los Angeles. NASA officials would not confirm the magazine's story which did not attribute a source for the information. McCartney is the former director of range engineering at the Air Force's Eastern Test Range at Patrick Air Force Base. He later became program director for the Space Division, the primary developer of military satellites. [Lafferty. Florida today, p. 1A, July 29, 1986.]

<> Challenger Pilot Michael Smith and Commander Francis "Dick" Scobee "probably knew something was wrong just as all communications with the shuttle were lost," NASA chief Richard Truly said at a press conference. Transcripts show that Pilot Smith said "Uh-oh" the split second before Challenger was destroyed. [Lafferty. Florida Today, pp. 1A & 2A, July 29, 1986.]

July 29: General Dynamics Corp. announced that planned layoffs at KSC will affect 115 workers between now and the end of the year. The original plan had been to layoff 130 workers. The layoffs are a direct result of NASA's cancellation of a program to use the Centaur rocket stage for launching payloads from the space shuttle. That cancellation was announced June 19 by Administrator James Fletcher. [Lafferty. Florida Today, p. 6A, July 30, 1986.]

<> One Kennedy Space Center worker was slightly burned and another became nauseous when they were exposed this morning to a highly toxic substance used to maneuver the shuttle, said a KSC spokesman. The Lockheed Space Operations Co. employees were working on a valve containing gaseous nitrogen tetroxide at Pad 39A when a cloud of the substance was released, said NASA spokesman George Diller. The cloud drifted over the ocean and temporarily diverted KSC bus tours. Both workers, whose names were not released by NASA, were treated at the KSC health facility and released. ["Fumes Injure 2 KSC Workers," Florida Today, p. 6A, July 30, 1986.]

July 30: Workers at Kennedy Space Center began installing engines in Columbia, the oldest shuttle in NASA's reduced fleet of three. The veteran orbiter's three main engines have been inspected and tested since the Jan. 28 Challenger accident, according to KSC spokesmen. The engines' fuel pumps were also replaced. [Lafferty. Florida Today, p. 7A, July 31, 1986.]

<> The search for debris from the Challenger tragedy will continue for another two weeks, said Air Force Colonel Edward O'Connor, head of the recovery operations for NASA. O'Connor said that engineers had requested the recovery of more parts of the tracking and data relay satellite which had been aboard Challenger. "We want to be sure we understand everything we can about it," O'Connor said. "We want to understand how it (the satellite) broke up to see if there are any marginal components." About 20 percent of the satellite has been recovered to date - about five percent less than the goal set by engineers. [Lafferty. Florida Toda, p. 7A, July 31, 1986.]

July 31: Richard G. Smith ended his career with NASA and Kennedy Space Center today; he will become president and chief executive officer of General Space Corp., a Pittsburgh-based company which wants to finance privately the construction of a new space shuttle. KSC Deputy Director Tom Utsman, 49, will administer the space center until Smith's replacement is officially named. [Lafferty. Florida Today, p. 7A, July 31, 1986.]

<> The city of Titusville formally thanked departing Kennedy Space Center Director Richard Smith for seven years of service in a letter sent to Smith by the north Brevard County city's council. "During your seven years of leadership at Kennedy Space Center, both the Space Center and the city of Titusville have seen dramatic changes. Our community has become a new focal point for commercial and industrial growth resulting from the expanding private sector involvement in space activities. In these difficult days for the space agency, we share your conviction that the program will emerge stronger than before, and we remain confident of the future and committed to meeting the challenges," the letter read. It was signed by Mayor Truman Scarborough and members of the City Council. [Cason. Florida Today, p. 5A, Aug. 1, 1986.]

<> July was the busiest month for Kennedy Space Center's Spaceport USA since bus tours were started twenty years ago. About 260,000 persons visited the attraction, topping the old record of 245,000 set in July 1972 when NASA was readying its last lunar mission and starting the Skylab program. Spaceport USA has been consistently setting monthly attendance records since the Jan. 28 Challenger accident. [Lafferty. Florida Today, p. 16C, Aug. 1, 1986.]

August 1: NASA has chosen Nov. 13 as the date it plans to launch GOES-H, a weather satellite which will restore full hurricane tracking capability. Spokesman George Diller said the launch will be aboard a Delta rocket and be at Cape Canaveral Air Force Station. The launch will be the second Delta mission when flights resume, Diller said. A classified military payload will be launched also on a Delta prior to the GOES-H. No date for the military launch has been announced. [Halvorson. Florida Today, p. 1A, Aug. 2, 1986.]

<> United Space Boosters Inc. officially opened its new $25 million Solid Rocket Booster Assembly and Refurbishment Facility at Kennedy Space Center. An outgrowth of USBI, the Booster Production Co. will assemble and refurbish after use the twin solid rocket boosters that help launch the space shuttle. The 238,000-square-foot structure will accommodate 800-900 persons, said Bernie Grossman, Operations Manager. Calling the building "a commitment to the future," Robert Daniell, president of United Technologies, USBI's parent company, said the facility "is designed for a shuttle program of the future, a growing program, a thriving program."

Grossman said that with the shuttle grounded till 1988, work at the new facility will focus on redesigning the boosters. "We'll spend the next year, or the next 18 months, or the next two years challenging ourselves to improve, to perfect what we do inside these walls." Grossman said that some boosters will continue to be produced as needed and that one is currently being built for testing. [Hess. Florida Today, p. 12C, Aug. 2, 1986.]

August 5: The cause of the Challenger accident was determined largely because scores of television and picture cameras made a detailed record of the tragedy with a clear sky as a backdrop, say presidential commission documents released in Washington today. The documents indicate that if the launch had been at night or skies had been overcast, "the amount of time required to reach the conclusions drawn would have been much greater and perhaps never as clearly understood." [A.P., "Cameras Helped Decipher Accident," Florida Today, p. 7A, Aug. 6, 1986.]

blamed for a potential shuttle catastrophe Jan. 6 when NASA nearly launched Columbia without enough fuel to reach orbit. The presidential commission released a previously unpublished study of work loads at KSC. The commission said the Jan. 6 launch was scrubbed after 18,000 pounds of liquid oxygen fuel "were inadvertently drained from the shuttle external tank due to an operator error." Brevard County's U.S. Rep. Bill Nelson (D-Melb.,FL) was aboard Columbia (61-C) when it successfully lifted off Jan. 12.

The study criticized NASA, Lockheed and Morton Thiokol for excessive overtime, multiple shift changes and long periods during which KSC workers were not given days off. The commission said those circumstances "represent a potential threat to safety and worke effectiveness" and concluded that "there is no system at Kennedy for monitoring overtime from the safety perspective." Lockheed spokesman John Williams said he was "aware of the overtime issue in a general way" and said, "all I can say is we'll study (the commission's report) closely and will see if the information in it can help us to continue our processing in an effective and safe way." [Halvorson & Kelley. Florida Today, pp. 1A & 2A, Aug. 6, 1986.]

August 6: Six community leaders from North Brevard were invited to a private meeting with Kennedy Space Center officials to discuss NASA's decision to close Playalinda Beach temporarily. Acting Director Tom Utsman said that with the shuttle program on hold it was important to begin assessing certain shuttle operations nw. "The timing is right from the overall standpoint of the program," he said. The beach will be closed beginning Sept. 2. NASA officials want to move the Atlantis to Launch Pad 39B to test a new system design and to protect the orbiter from potentially damaging rain and winds. [Cason. Florida Today, p. 11A, Aug. 7, 1986.]

<> NASA said today that Kennedy Space Center is developing new rules aimed at reducing the amount of overtime and the number of consecutive days an employee can work. KSC spokesman Hugh Harris said various KSC engineers are studying work loads in an effort to establish new guidelines. These officials, in turn, will make recommendations for changes to acting director Thomas Utsman and to Robert Sieck, KSC's director of space shuttle operations. [Halvorson. Florida Today, p. 1A, Aug. 7, 1986.]

August 7: John Plowdon, an associate director of Rocketdyne's space shuttle Main Engine program, was identified as the man applauded by Congressman Bill Nelson (D-Melb.,FL) for averting a catastrophe of the Columbia when Plowdon halted its launch on Jan. 6. [Halvorson & Kelley. Florida Today, p. 2A, Aug. 8, 1986.]

August 11: NASA's performance rating of Lockheed Space Operations Co. dropped from excellent during a six-month period between April and September 1985 to very good for the October 1985/March 1986 period, according to NASA documents obtained by Florida Today under the Freedom of Information Act. A rating of very good means Lockheed "is performing in a highly commendable manner" but there are areas "needing improvement and management attention that detract from performance which could otherwise be rated higher." Lockheed received a reduced bonus due to the lower rating. [Lafferty. Florida Today, p. 1A, Aug. 14, 1986.]

August 13: Divers began a visual search of every square foot of ocean bottom where shuttle debris fell after the Challenger accident. Ships dropped anchor lines to form a grid pattern on the ocean floor, said Air Force Col. Edward O'Connor, head of the NASA salvage effort. The search continued in order to find pieces of the shuttle and its payloads - a tracking and data relay satellite and Spartan-Halley satellite - that weren't found during initial searches of the area, O'Connor said. The search, much smallerin scope than a few months previously, may last until the end of August, O'Connor said. [Lafferty. Florida Today, p. 1A, Aug. 14, 1986.]

<> NASA recommended that Lockheed Space Operations Co. receive a $5.7 million profit, or 81 % of its potential award, for the six-month period ending March 31. At Kennedy Space Center, the shuttle processing contractor's performance slipped from a previous rating of "excellent" to "very good." [Hinman. The Orlando Sentinel, pp. C-1 & C-6, Aug. 14, 1986.]

August 15: Lockheed Space Operations will layoff 985 workers, Grumman Technical Services will idle 132 employees and Morton Thiokol will reduce its labor force by 53 workers, according to trade journal Aviation Week & Space Techology. Acting KSC director Tom Utsman was in Washington, D.C., and couldn't be contacted for comment. Lockheed's public relations spokesman John Williams said, "I don't have any knowledge of such activity taking place." He added, however, that "it would be overly optimistic to say there would be no additional reduction in the KSC workforce.

"Internally," Williams said, "we're engaging in contingency planning so we can be prepared for whatever scenario we're presented with. We're awaiting direction from NASA, our customer, and we'll respond to that. I think it would be reasonable to assume at one point NASA would give us some definitive direction." If the predicted 1,100 layoffs do occur, it would bring to 2,300 the number laid off since the Challenger accident. ["Magazine: 1,100 KSC Layoffs Planned," Florida Today, p. 1A, Aug. 15, 1986.]

<> President Reagan approved building a $2.8 billion shuttle to replace Challenger, but how NASA will pay for the new orbiter was unclear. Reagan also ordered NASA to phase out its commercial satellite business to provide a strong incentive for a U.S. commercial rocket industry. "Without the fourth orbiter, NASA's capabilities would be severely limited and long-term projects for the development of space would have to be postponed or even canceled," the president said in a prepared statement. [Fisher. The Orlando Sentinel, p. A-1, Aug. 18, 1986.]

<> Thomas Utsman, Kennedy Space Center's deputy director, said he expects to lay off workers at the space center but that the numbers are not final. He would not discuss the range of layoffs being discussed, but he said a decision would be made by Sept. 1. The acting KSC chief said layoffs would be needed partly because of a need to save money and partly because of a lack of shuttle work to perform.

"You don't want to sit and have people just punching time cards and play cards all day. It's not good for the people; it's not good for the nation or anyone else. But there is a lot of work" to be done,

Utsman said. The biggest effect of the space agency's slowdown may be the dramatic payroll reduction resulting from the elimination of overtime, Utsman has said. [Hinman. The Orlando Sentinel, pp. B-1 & B-4, Aug. 17, 1986.]

August 18: Kennedy Space Center's new director will be named by the end of the month, said NASA Administrator James Fletcher. He said that NASA is awaiting word on its fiscal 1987 budget before making a decision on possible job cuts. "I can't say one way or the other whether there will be additional layoffs at KSC in the near future," he said. [Halvorson. Florida Today, p. 1A, Aug. 19, 1986.]

August 20: Air Force Lt. Gen. Forrest McCartney has been appointed director of Kennedy Space Center, the first military officer to hold that post. Former director Richard Smith said concerning his successor that McCartney was "good for KSC, and I think the KSC employees will like him." Because of his high rank, McCartney had to be nominated for the directorship by President Reagan and still must be confirmed by the Senate, said Air Force spokesman Capt. Miles Wiley. The confirmation is not expected to be controversial and won't take place until the Senate returns from its recess after Labor Day, Wiley said.

McCartney was director of range engineering for the Eastern Test Range (now the Eastern Test and Missile Center) at Patrick Air Force Base from 1971 to 1974 and still has a home in Indian Harbour Beach, according to acting KSC director Tom Utsman. McCartney has held several other space-related positions since leaving Patrick, including commander of the MX program.

NASA Administrator James Fletcher said: "General McCartney's close association with our nation's space program and his outstanding management record make him an excellent choice to become director of Kennedy Space Center." Acting Director Utsman said, "I think we're very fortunate to get Gen. McCartney." [Lafferty. Florida Today, pp. 1A & 4A, Aug. 21, 1986, and "General to Be New KSC Chief - Report," Florida Today, p. 5A, Aug. 21, 1986.]

August 21: About 2000 persons gathered at Kennedy Space Center to start a nationwide campaign to raise

$24 million to honor the crews of Challenger and Apollo 1. The event was the result of seven months of organizing by Central Floridians in civic and business organizations. The Astronauts Memorial Foundation, a non-profit organization formed to conduct the work, has collected $15,000 toward its $24 million goal in 1991. The target date for completing the memorial building is Jan. 28, 1989, third anniversary of the Challenger disaster. Other foundation projects are planned to continue into the early 1990s. Contributions may be sent to: Astronauts Memorial Foundation Inc.
P. O. Box 628003
Orlando, Florida 32862-8003
[Glisch. The Orlando Sentinel, p. D-1, Aug. 22, 1986.]

August 25: NASA plans to determine whether the joints betweem sp;od rocket booster segments are strained when a shuttle is transported from the Vehicle Assembly Building to a launch pad at Kennedy Space Center. The tests will occur when the Atlantis, attached to its external tank and solid rocket boosters, is moved to Pad 39B in mid-September, said Jim Ball, NASA spokesman. The tests were requested by Marshall Space Flight Center and have never been conducted before. "There's no expectation that we will see anything (unusual) but we don't have hard data to show that," Ball said. "It's really just for verification." [Lafferty. Florida Today, p. 2A, Aug. 26, 1986.]

<> Virginia Jackson (EG&G) who inhaled halon gas was treated and released today from Jess Parrish Memorial Hospital (Titusville, FL). She breathed the fumes when they were released automatically during a false fire alarm about 3:50 p.m. at Kennedy Space Center, said Dick Young, a NASA spokesman. He said the gas was a fire extinguishing chemical. Twelve other EG&G employees who were exposed to the gas complained of discomfort but none required treatment. ["EG&G Employee Inhales Halon Gas," Florida Today, p. 3A, Aug. 26, 1986.]

August 28: NASA ended its search for debris from Challenger after seven months and millions of dollars of expenditures. The search once covered an area of 14,000 square miles from Cape Canaveral to North Carolina and employed as many as 6,000 people during peak times. The cause of Challenger's destruction was evidenced by the April 13 recovery of a piece from the aft center segment of the right solid rocket booster about 40 miles offshore in 560 feet of water.

Searchers recently spent weeks looking for wreckage from the Challenger's cargo bay. Air Force Col. Edward O'Connor, who has headed the search operation, said it is possible still that NASA engineers may request the salvage operation be prolonged in order to find missing pieces of debris. ["Shuttle Recovery Operation Involved 6,000 Workers," Florida Today, p. 6A, Aug. 28, 1986.]

<> Also recovered in the search for debris were: 45 percent of the orbiter; 50 percent of the external fuel tank and solid rocket boosters; 35 percent of the tracking and data relay satellite; 90 percent of the satellite's rocket booster and 95 percent of the Spartan-Halley experiment. Col. Edward O'Connor, who directed the salvage effort, said the search led to several developments in salvage technology that the Air Force is attempting to patent. The Navy discovered there was a worldwide shortage of unmanned submarines capable of working in strong currents. [Lafferty. Florida Today, p. 2A, Aug. 29, 1986.]

August 31: Spaceport USA at Kennedy Space Center enjoyed a record-breaking summer; monthly attendance records fell regularly. Attendance ran 20 percent ahead of last year's rate, according to H. B. Chambers, vice president of TW Services, which operates the attraction. If the trend holds, "we will surpass 1985's two million visitor total," Chambers said. ["Summer Tourism: It Wasn't the Record Breaker Many Had Forecast," Florida Today, p. 18C, Sept. 1, 1986.]

September 2: NASA plans to cancel 15 to 20 Spacelab missions scheduled to be flown on shuttles as a direct result of the Challenger accident, said an article in Aviation Week & Space Technology this week. "There is no point in us putting any funding now into any mission that will have no flight activity in five years, so those missions have been canceled," Samuel Keller, NASA deputy associate administrator for space science and applications said. NASA now plans to launch only three more Spacelabs before the end of the decade. [Halvorson. Florida Toda, p. 1A, Sept. 2, 1986.]

<> Joan F. Kennedy Inc. (Cape Canaveral, FL) was awarded a contract worth $84,963 by NASA to fabricate and install a paging system in the Orbiter Modifications and Refurbishment Facility at Kennedy Space Center. The single-bay facility will be used for powered-down work on orbiters between flights and is expected to be completed early in 1987. The OMRF will be located across from the Orbiter Processing Facility (OPF). The new paging system will be used to alert personnel of hazardous operations going on in their immediate area and will allow workers to hear all other announcements being made in the Complex 39 area. ["Joan F. Kennedy Inc. Awarded KSC Contract," Florida Today, p. 14C, Sept. 3, 1986.]

September 4: Acting KSC Director Thomas Utsman announced at 3:30 p.m. that there would be an additional 1,108 layoffs from work at the space center. He also said that these layoffs should be the last to result from the Challenger accident which had earlier precipitated the loss of another 1,100 jobs.

Utsman said the agency plans to recall some of the critically skilled workers as early as next spring and summer. Speaking centerwide over the public address system at the beginning of a news conference, Utsman said: "There's going to be a lot of mourning tonight and I'm going to be mourning with them." He said laid-off workers will start receiving pink slips the next day - Sept. 5 - with the layoffs taking effect two weeks later on Sept. 19.

"This is one of the most painful things I've had to do in my life," Utsman said. "I think that we have an excellent workforce. We're very close to our people and this is not a fun thing to do. It is one of the inevitable things that has to be done with respect to the situation," he said.

He said, further, that the majority of affected workers will be technicians and quality control workers. The one exception will be critically skilled engineers. "The engineering workforce is fundamentally not being affected," Utsman said. Responding to a question concerning morale at the space center, Utsman said I don't think the morale is too good. But I think as you look at it, you have to get strong and come back. I think the work is there, and I think the people realize that. As you look ahead, I think the morale of these people will improve.

"The only caveat I would put on that, Utsman continued, "would be if there were some significant change in program content or something like that, and we don't foresee that at this time. We're going to be bringing people back - depending on the particular skills - as much as nine to twelve months" in advance of the next shuttle launch, Utsman said.

The majority of the layoffs - some 834 - affect companies which work on the Shuttle Processing Contract: Lockheed Space Operations Co. will reduce by 582 employees; Grumman Technical Services will furlough 142 workers; Morton Thiokol Inc. will lay off 78 workers and another 32 workers will be laid off from Lockheed subcontractors. Two other companies not involved in the shuttle processing work will also reduce their workforces: McDonnell Douglas - shuttle payload processor - will reduce by 133 workers; EG&G Florida - the base operations contractor - will eliminated 141 employees from its workforce. Previously, EG&G had laid off 32 persons. [Halvorson & Lafferty. Florida Today, pp. 1A & 2A, Sept. 5, 1986.]

<> Holloway Corp. (Titusville, FL) was awarded a $61,789 contract by NASA's Kennedy Space Center to provide 10 additional Operation Intercommunications System units. The system enables ground technicians and engineers to communicate between the firing room and the launch pad, and other sites where shuttle hardware is processed. The OIS units will be used as spares, serving as

backups to an existing 115 units. ["Holloway Corp. Gets NASA Job," Florida Today, p. 16C, Sept. 5, 1986.]

<> Launch Complex 39A will be put into "inactive status" for about two years to allow time for needed modifications, NASA announced. Some of the 1,108 layoffs also announced today were tied to the 39A decision, said Tom Utsman, KSC's acting director. LC 39B - from which Challenger lifted off Jan. 28 - will be the primary launch facility when the program resumes in 1988; the pad's mulitimillion dollar refurbishment was completed late in 1985. NASA also plans to mothball "for a few years" one of the mobile launch platforms used to launch the shuttle, Utsman said.

Both Pad 39A and the launch platform are being shut down because of the reduced number of shuttle flights anticipated when the program resumes, Utsman said. "We will bring it (Launch Pad 39A) back up when we need the flexibility of two pads," he said. In addition, NASA is examining whether other facilities should be closed, Utsman said, but declined to specify which facilities are being studied. [Lafferty. Florida Today, p. 4A, Sept. 5, 1986.]

<> Astronaut David Walker recently visited Pad Operations and Mobile Launcher Platform workers during a visit to the Kennedy Space Center. Walker, who piloted Discovery on shuttle mission 51-A in November 1984, briefed all shifts on the current status of training among the astronauts. He then stated, "On behalf of the astronaut corps, I want to extend my sincere appreciation for the outstanding job you've done and are still doing under some difficult circumstances. You have not been forgotten and we want you to know we still have the highest confidence in the jobs you do." Walker added, "This is not the time to bury our heads in the sand, but to look up and go forward with the tasks that will lead us back to flying the shuttle again." ["Astronaut Walker Praises Workers 'Outstanding Job'," Star Gazer, p. 1, Sept. 4, 1986.]

September 5: An unmanned Delta rocket carrying two experiments said to be part of the strategic defense initiative lifted off from Cape Canaveral Air Force Station at 11:08 a.m., said Department of Defense officials. "I thin (the Delta mission) was very significant," said NASA launch director Charles Gay.

"The agency needed it - we needed it for morale purposes, and the country needed it because we've had a string of failures." NASA officials said the launch went smoothly except for some turbulence when the first six of the rocket's nine solid rocket boosters were jettisoned, but the disturbance was said not to be unusual and caused no problems. Security was tight for the Delta launch, with Air Force guards wearing fatigues and carrying automatic weapons while patrolling the site. Launch time was kept a secret till minutes before it occurred. [Lafferty & Halvorson. Florida Today, p. 1A, Sept. 6, 1986.]

<> Lockheed Space Operations Co. was given a three-year $1.3 billion extension of its Shuttle Processing Contract for East and West Coast shuttle launch sites, NASA announced. The contract, which takes effect Oct. 1, involves all aspects of preparing the shuttle for flight and employs some 5,600 workers. The new contract totals $927.2 million for operations at Kennedy Space Center through Sept. 30, 1989, plus $390.7 million for operations at the shuttle launching facility at Vandenberg Air Force Base in California. Several changes were made to the contract. For instance, shuttle chief Richard Truly announced that a review group would be formed to scrutinize shuttle processing - as well as the contract. Also, the Vandenberg facility will be unused till 1992. [Lafferty. Florida Today, p. 5A, Sept. 6, 1986.]

September 7: Betty Barksdale Broadwell, 47, a Kennedy Space Center security guard on her way home from work, was killed early this morning after she lost control of her car and flipped over in the median on U.S. 1 about a mile south of Titusville, said a Florida Highway Patrol spokeswoman. Mrs. Broadwell was driving north on U.S. 1 mear SR 405 about 6:10 a.m. when her 1979 Toyota left the road, FHP reports show. She was pronounced dead at Jess Parrish Memorial Hospital (Titusville, FL) about half an hour later. Broadwell, who worked for EG&G Florida, was the 63rd person to die on Brevard County roads this year, compared to 72 fatalities last year at this time. ["KSC Guard Dies in Accident," Florida Today, p. 3A, Sept. 8, 1986.]

September 8: NASA expects to save nearly $56 million as a result of the 1,100 layoffs announced last week at Kennedy Space Center. The KSC workforce was reduced by another 1,100 workers during two waves of layoffs earlier this year. More than half those layoffs

resulted from contracts being completed, while the other half were related to the Challenger tragedy. NASA spokesman Dick Young said he did not know how much money was saved from the earlier layoffs. [Lafferty. Florida Today, p. 2A, Sept. 9, 1986.]

<> The space shuttle Columbia's move from Kennedy Space Center to Vandenberg Air Force Base in California was delayed for a month, officials said. The new transfer date will be the first week in November, said NASA spokesman Dick Young. The delay gives KSC workers more time to modify the orbiter so it can be used to test the Air Force's new $3.3 billion shuttle launching facility, Young said. "It just makes more sense to do that work here than to do it out there (at Vandenberg)," said Young. Despite plans announced to mothball the west coast shuttle facility, Young said "plans are very much still in the offing to move Columbia to Vandenberg." He did add, however, that those transfer plans are undergoing review by NASA management. [Lafferty. Florida Today, p. 2A, Sept. 9, 1986.]

<> Spaceport USA will open an 1,150-square-foot exhibit next month that will use space-age technology to focus on the numerous species of wildlife that live in the shadow of Kennedy Space Center's launch facilities. The $280,000 exhibit has been in the planning stages for a year and will include animatronics - life-size computer-operated human figures - in a 4 1/2-minute walk-through presentation. [Foster. The Orlando Sentinel, pp. D-1 & D-7. Sept. 9, 1986.]

<> NASA selected Boeing Aerospace Operations Co. (Cocoa Beach, FL) to receive a one-year contract worth $1 million to help interest U.S. companies in the potential of making money in space. With two one-year renewable options, the contract with Boeing could last three years. Once interested companies have been identified, Boeing will assist them in making plans for experimentation as well as for obtaining financing and getting into orbit. Peat, Marwick Mitchell & Co., a national acounting firm that has sponsored space-business roundtable programs and other space-commercialization education projects, will be Boeing's major subcontractor in the NASA contract, said Bill Fedor, deputy project manager for the new Boeing contract. [Hinman. The Orlando Sentinel, p. A-4, Sept. 9, 1986.]

September 10: Eight employees of TW Services, led by Program Manager Tom Anderson, were given the KSC Aerospace Awareness Team Award for production of two shows at Spaceport USA's Galaxy Theater. One of the shows is for new employee orientation. The other is a 25-minute live presentation entitled "Adventures in Technology," which uses videotape and live performers. Recipients of the award include: Kim Flick, Joel Carraway, Jim Grossman, Dean Flick, Mark Crain, Laura Mark and Debbie Parrish. ["Spaceport USA Creative Juices Flow," Florida Today, p. 2A, Sept. 11, 1986.]

<> About 130 furloughed Lockheed employees attended an orientation session explaining the services of Lockheed's "outplacement center," according to Stuart Shadbolt, a spokesman for Lockheed Space Operations Co. Another 200 laid-off workers are scheduled to attend sessions which include services such as resume preparation, use of telephones, typewriters and copy machines and classes on where to find jobs and how to interview. EG&G spokeswoman Laurie Statmore said her company has received 25 inquiries from people wanting help in their job search. Grumman Technical Services, which laid off 142 workers Sept. 5, might be able to put some of its displaced workers in a new division expected to begin operations next year in Melbourne, said spokeswoman Miriam Reid. The 133 employees furloughed by McDonnell Douglas received a list of potential employers, including other McDonnell Douglas divisions, said spokeswoman Kathi McDonald. [Lafferty. Florida Today, p. 7A, Sept. 11, 1986.]

September 12: Prior to the Challenger accident, NASA officials had been concerned about how they would handle the media if such a tragedy came about, said public affairs director Chuck Hollinshead. Just seven days before a scheduled mock disaster on which space agency officials planned to practice, they got the real thing. "It was a week too late," said Hollinshead of the planned exercise.

Within weeks of the Challenger tragedy, 2,000 members of the media were at KSC covering the event. Hollinshead said staff members tried to follow the basics of a 1980 contingency plan, but they didn't expect to have as much trouble getting information from NASA operations officials. The delays created problems in getting reporters the information they needed and sometimes made it seem as though Public Affairs was withholding information, Hollinshead said. [Schroder. Florida Today, p. 7A, Sept. 13, 1986.]

<> The USS Preserver, which conducted most of the Challenger crew cabin recovery earlier this year, will be decommissioned Sept. 30 in a ceremony at the ship's home port in Little Creek, VA, said Navy Chief Journalist Scott Kimball. "A ship's like a car," he said. "You can only own it so long. She's lived a very useful life." [Lafferty. Florida Today, p. 7A, Sept. 13, 1986.]

September 13: Christine Brown, 33, an employee of EG&G, gave birth to a healthy girl in her car moments after the vehicle pulled up to the back door of the Occupational Health Facility at Kennedy Space Center. She'd been driven to the dispensary by her husband who also works at the space center. The 7-pound infant, first ever born at the space center, was delivered about 4 p.m. by Dr. Margaret Moore. Mrs. Brown and her newborn daughter were taken to Cape Canaveral Hospital and were listed in good condition. ["Woman Gives Birth Upon Arrival at KSC Dispensary," The Orlando Sentinel, p. D-10, Sept. 13, 1986.]

September 15: Atlantis's rollout to Launch Complex 39B was delayed till next month, said NASA spokesman Jim Ball. A problem was discovered about two weeks ago with some doors at the pad that provide access to the shuttle's payload bay and their repair proved more difficult than expected, Ball said. "For some reason, they (the doors) get the point where they are binding up," he said. Technicians recently finished installing devices on Atlantis's right solid rocket booster to monitor stress, Ball said. [Lafferty. Florida Today, p. 2A, Sept. 16, 1986.]

<> Rear Admiral Richard H. Truly, NASA's associate administrator for space flight, said he will form a review group to assess shuttle processing, the processing contract and the relationship between flight hardware contractors. That also could affect the value of the cost-plus-award-fee contract which is negotiated every six months. ["Lockheed Shuttle Contract Extended," Aviation Week & Space Technology, p. 24, Sept. 15, 1996.]

<> Cutbacks in the Spacelab program produced several hundred layoffs and reassignments already with more likely to come. The shuttle budget contained about $90 million per year before the accident to support a Spacelab/shuttle integration workforce of 800-900, which has been reduced by about 80 workers at Kennedy Space Center. Spacelab personnel supported by the space science budget is expected to be reduced by 350 workers because of a $35-$40 million reduction in the $100 million pre-Challenger accident annual Spacelab budget. ["Industry Observer," Aviation Week & Space Technology, p. 15, Sept. 15, 1986.]

September 18: The 1,108 layoffs announced by NASA on Sept. 4 take effect today. "I've seen a big change in morale since everybody knows where they're at," said Pat Oliver, spokeswoman for McDonnell Douglas. "I think most of them understand. They're sad to leave but they're taking it well," she said. While about 2,200 jobs have been lost at KSC since the Jan. 28 Challenger accident, some were eliminated when contracts expired or when the shuttle-Centaur booster program was canceled. Today's layoffs are expected to be the last unless the next shuttle mission is delayed beyond early 1988 or unless there are other "program changes," NASA officials have said. Barring those prospects, NASA expects to be rehiring some workers early next year. [Lafferty. Florida Today, p. 1A, Sept. 19, 1986.]

September 22: Silver Snoopy awards were given by shuttle astronaut David Walker to George Ammatuna, a senior engineer with Lockheed Space Operations Co., and Frank Johnson, a maintenance service worker for United Services Inc. [Lafferty. Florida Today, p. 2A, Sept. 22, 1986.]

<> The first stage of an unmanned Delta rocket scheduled for launch later this year was erected on a launch pad at Cape Canaveral Air Force Station. An "interstage" that connects the first and second stages of the rocket will be installed Sept. 23, while nine solid rocket boosters are to be strapped onto the rocket later this week, said George Diller, NASA spokesman. A weather satellite owned by the National Oceanic and Atmospheric Administration will be the Delta's cargo. The satellite is identical to one destroyed in a May 3 Delta accident. November's Delta launch will come two weeks after the liftoff of an unmanned Atlas-Centaur rocket, for no earlier than Nov. 6. [Lafferty. Florida Today, p. 2A, Sept. 23, 1986.]

September 24: John Buckley, 52, a contract manager at Kennedy Space Center, qualified for the District 1 city council race in Melbourne, FL, to replace Vice Mayor Robert E. Mitchell. Buckley is opposed for the council seat by real estate broker Adrian Hoff and insurance agent Richard Filichia. ["NASA Worker Enters Race for Council," The Orlando Sentinel, p. D-14, Sept. 25, 1986.]

October 1: Kennedy Space Center's new director, Air Force Lt. Gen. Forrest McCartney, spent his first day on his new job meeting key center managers and addressing KSC employees over closed-circuit television. In that address, McCartney said, "I can't tell you how delighted I am to be here and [to] be a part of your team. I can think of no other place I'd rather be today than here, on board, in this job. We've come through a period that has not been pleasant for many of us," he said. "We have an important mission and some very exciting times ahead and I'm looking forward to it." [Lafferty. Florida Today, p. 12A, Oct. 2, 1986.]

October 2: Kennedy Space Center Director Forrest McCartney said today he doesn't anticipate making any major changes in the center's operations or management. "Right now I can think of no significant changes I certainly see that need to be made," he said. "Any organizational changes I see would be those that would evolve and would be driven by the job to be done. I think that undoubtedly we will see some changes, but not due to my coming here."

A journalist, noting McCartney's military background, asked him whether information on KSC's operations would become less available. "I would like to assure you right off the bat," McCartney responded, "that the policy of openness and of providing you with as timely information ... as we possibly can is one that will continue here." He also remarked that his appointment did not represent a militarization of NASA. "I came here with absolutely no instructions from the Department of Defense," he said. I came as a person who has the experience - who wanted the job because I think it's important. I work for Dr. Fletcher," he said, referring to NASA Administrator James Fletcher. [Lafferty. Florida Today, p. 6A, Oct. 3, 1986.]

October 4: The rollout of Atlantis to Launch Complex 39B Oct. 7 will be the first shuttle rollout in nine months and more than likely the last until 1988. Atlantis will make the 4.2 mile trip without its main engines and will remain on the pad for seven weeks to undergo a battery of tests NASA officials want to complete before the next shuttle launch in Feb. 1988.

"We're going to be so involved in processing that flight that we probably won't have another opportunity to do this," said NASA spokesman Jim Ball. Launch pad tests will include: checking out a $3.3 million weather protection system; conducting a practice countdwon designed to "help maintain launch team proficiency" while the shuttle is grounded, and allowing astronauts to practice techniques for leaving the shuttle during an emergency on the launch pad. [Lafferty. Florida Today, p. 7A, Oct. 5, 1986.]

October 6: A Delta rocket mission previously scheduled for Nov. 20 has been delayed till the first part of December, NASA officials said today. The delay was caused by a problem with the rocket's payload, the GOES-H weather satellite. The satellite's photo-imaging system has not been functioning properly and the faulty components will be replaced. ["Payload Problem Puts Delta On Hold," Florida Today, p. 2A, Oct. 7, 1986.]

October 7: NASA delayed the rollout of the space shuttle Atlantis for at least 24 hours because of adverse weather conditions - heavy rain and lightning - spokesman Jim Ball said early today. [Halvorson. Florida Today, p. 2A, Oct. 7, 1986.]

October 8: Kennedy Space Center awarded a $1,093,192 contract extension to BAMSI, Inc. (Titusville, FL) to provide base operations support services for KSC's Space Transportation System Resident Office at Vandenberg Air Force Base, CA. The contract extends the period of performance from Oct. 1, 1986, through Sept. 30, 1987, bringing the total value of the contract to $3,788,177. [Boles NASA/KSC News Release No. 126-66, Oct. 8, 1986.]

October 9: A small hydraulic leak in the crawler transporter delayed the start of Atlantis's rollout to Pad 39B till 12:26 a.m., a half hour later than projected. "It (the leak) was quickly repaired and of no concern," said Conrad Nagel, flow director for Atlantis. The shuttle reached the pad about 6:30 a.m. and was secured in place shortly after 8 a.m., Nagel said. Part of one test was completed during the rollout, said Nagel. Mounted sensors gathered information about how the rollout affected the joints between the segments in the solid rocket boosters. A leaking joint was blamed for triggering the Challenger

accident. Nagel said engineers should have the test data analyzed by next week, although officials believe the results will show rollout effects to have been insignificant. The sensors will also be used to collect information during the shuttle's return to the pad. [Lafferty. Florida Today, p. 8A, Oct. 10, 1986.]

October 15: New Kennedy Space Center Director Forrest McCartney told the Titusville Chamber of Commerce that the nearly 2,200 people laid off at KSC in the wake of the Challenger tragedy will be the last to leave. He added that he will make every effort to recall idle workers as soon as possible. Morale at KSC, which McCartney had called "a problem" at his first press conference Oct. 2, has improved now that Atlantis is on the pad for tests. "It's just really great to get something back on the pad. You can see the morale bubbling up from that alone," he said.

"If you stop and think about it," McCartney said, "it takes about four to five months to actually process the shuttle. So, we'll be starting that process about a year from now. And when you consider all the modifications (to the shuttle) we will be making, it's going to be a very busy period and very active period. There will not be a lot of waiting around." [White. Florida Today, p. 1A, Oct. 16, 1986.]

October 16: Columbia, the last shuttle to fly in space, will be mothballed indefinitely at Kennedy Space Center, NASA said today. The decision was made because Columbia's trip to Vandenberg Air Force Base, CA, had been canceled, and Columbia will be the last of the three remaining shuttles to fly when missions begin again in 1988. Jim Ball, NASA spokesman at KSC, said plans are being made to remove Columbia's three main engines as well as its orbital maneuvering system. Other orbiter systems will also be removed for repair, Ball said. Columbia will then be transferred to the VAB, where it "will remain in storage for quite some period of time," said Ball. While Columbia is idle, workers at KSC will concentrate on preparing Discovery and Atlantis for flights in 1988 - February and May, respectively. Columbia is not scheduled to fly again till July 28, 1988, carrying a DOD payload. [Halvorson. Florida Today, p. 1A, Oct. 17, 1986.]

October 22: During his opening remarks to about 450 business representatives packed into Spaceport USA's Galaxy Theater, KSC Director Forrest McCartney said small business opportunities at KSC will be "as limitless as space itself" while NASA reconstructs the shuttle program and moves toward the commercialization of space. "I guess what I'm trying to say is we're in a period of increased activity and that activity will continue to increase for a long time to come," McCartney told conference attendees.

It was the fifth such briefing in four years coordinated by NASA's KSC Industry Assistance Office, and the first-day attendance was the highest ever for the two-day event, according to KSC officials. Florida firms made up more than 85 percent of those present. Others came from as far away as Heanor Derbyshire, England. [Bixler. Florida Today, p. 16C, Oct. 23, 1986.]

October 23: Brenda Forman, director of international marketing policy for Lockheed Corp. said in a speech at Kennedy Space Center that the United States stands to lose its leadership in space if the federal government continues to insist that commercial development be financed primarily by industry.

"If the United States truly intends to be the leader in the commercial development of space in the rest of the century, I maintain that it is going to depend directly on the degree to which we successfully devise ways to share the risk between the government and the private sector," Forman told a forum on the commercialization of space at KSC. "Neither Congress nor the American public has gotten the message yet - space is not a frill," said Forman. [Hinman. The Orlando Sentinel, pp. C-1 & C-6, Oct. 24, 1986.]

October 26: Air Force Captain Joe Fury and the Apollo Society are determined to have Apollo 11's 410-foot launch tower restored and erected at the Spaceport USA Visitors Center along with a full-scale replica of a Saturn 5 rocket. "We think now is a good time to glorify the great triumphs of the space program," said Captain Fury.

The tower, torn down in 1983 and now in pieces behind NASA hedquarters at Kennedy Space Center, was also used for Apollo 8, the first flight to orbit the moon; the joint Apollo-Soyuz mission; and the first Apollo Skylab mission. Fury said $15 million is needed to erect the tower and construct the Saturn 5 replica; another $5 million would be raised for maintenance and preservation. Donations may be made to:

Apollo Society
P. O. Box 790
Lompoc, California 93438

[Cason. Florida Today, p. 4A, Oct. 27, 1986.]

October 27: Delays ranging from one week to more than two months were announced for two unmanned rockets that had been scheduled for launch from Cape Canaveral later this year. A Delta rocket set to carry a National Oceanic and Atmospheric Administration weather satellite into orbit in early December has been rescheduled for no earlier than Feb. 19, 1987, because of changes being made to the rocket's payload.

Less severe is a delay in the launch of an Atlas-Centaur rocket, which has been moved from Nov. 13 to Nov. 21 so launch teams can perform another practice countdown, said NASA spokesman George Diller. A practice countdown conducted Oct. 9 went smoothly, but officials want to repeat the procedure after technicians finish replacing certain guidance components aboard the rocket, Diller said. [Lafferty. Florida Today, p. 2A, Oct. 28, 1986.]

<> A fiscal 1987 budget increase for NASA will translate into a boost for employment along the Space Coast, U.S. Rep. Bill Nelson (D-Melb., FL) told Brevard County business leaders. By Sept. 1987, the space agency should start rehiring some of the 2,200 employees laid off after the Challenger accident, as it prepares for a Feb. 1988 shuttle flight, Nelson said.

By the third shuttle launch, all 2,200 employees should have been rehired and the 16,000-member workforce at Kennedy Space Center will continue to grow even larger, said Nelson. The added workforce will result from the effort to orbit a space station by 1992. [Bixler. Florida Today, pp. 13C & 14C, Oct. 28, 1986.]

October 28: NASA's Kennedy Space Center awarded Butler Construction Company (Rockledge, FL) an $838,000 contract for construction of a piping system needed to provide heating and air-conditioning for two buildings that are under construction at KSC's Launch Complex 39 area.

The contractor will run standard steel 18-inch diameter pipe from the Central Utility Annex located west of the Vehicle Assembly Building to the new Orbiter Modification and Refurbishment Facility (OMRF) and the new Thermal Protection System Facility (TPSF). The Central Utility Annex provides heating, air-conditioning and compressed air to all major facilities at Complex 39.

The new single-bay OMRF provides additional need space to perform modification, rehabilitation and overhaul work on space shuttles. It is located across from the existing two-bay Orbiter Processing Facility (OPF). The target date for completion is March 1987. The fixed-price-contract award to Butler Construction Co. is one set aside for small businesses. [Boles. NASA/KSC News Release No. 135-86, Oct. 28, 1986.]

October 29: NASA's Kennedy Space Center awarded Computer Sciences Corporation (KSC, FL) a $1,172,656 contract extension. This cost-plus-award-fee contract extension, with six one-month options through June 1987, covers the period Oct. 1, 1986, through Dec. 31, 1986, bringing the total value of the existing contract to $11,408,274. CSC provides telemetry, instrumentation and communication services to support tests and launches of the Delta and Atlas/Centaur vehicles conducted at NASA facilities on Cape Canaveral Air Force Station. [Boles. NASA/KSC News Release No. 137-86, Oct. 29, 1986.]

<> Horace Lamberth, head of shuttle engineering at Kennedy Space Center since 1984, will retire Oct. 31, after 22 years with NASA and join Lockheed Space Operations Co. (Titusville, FL) as vice president for engineering. [Glisch. The Orlando Sentinel, p. A-4, Oct. 30, 1986.]

October 30: Former Kennedy Space Center Director Richard Smith, who retired from NASA to become president and chief executive officer of General Space Corp. is now out of a job. Astrotech International decided to cease

operations of its subsidiary - General Space. Contacted at his Pittsburgh, PA, home, Smith said he planned to return to Florida. He said he "knew there was a risk" when he accepted the job but was eager for the challenge. Astrotech's satellite processing facility in Titusville will not be affected by the General Space decision, Smith said. [Lafferty. Florida Today, p. 6A, Oct. 31, 1986.]

<> Discovery's transfer from the Vehicle Assembly Building to a processing hangar was hailed as a "milestone in the space shuttle's return to flight," according to NASA spokesman Jim Ball. "This is sort of the next step in getting Discovery ready for flight," he said. Sometime in December 1987, Discovery will return to the VAB to be stacked with an external fuel tank and two redesigned solid rocket boosters. "Next time it comes out it'll be rolling out to the pad for the launch next February [1987]," said KSC Deputy Director Tom Utsman. [Lafferty. Florida Today, p. 6A, Oct. 31, 1986.]

October 31: Spaceport USA at Kennedy Space Center continues to break monthly attendance records. "This is the fourth month in 1986 that new attendance records have been set," said H. B. Chambers, vice president and general manager of TW Services Inc., operators of the attraction. A total of 124,596 people visited the Spaceport in October, representing a 21 percent increase over last October's figure of 103,329 visitors. The previous record for October was set in 1981 with 123,329 visitors. The Spaceport attracted more than 217,000 visitors in June and about 276,000 in July, setting a one-month attendance record. Then came 232,000 visitors in August, followed by a drop in September to 89,435. ["Spaceport USA Breaks Record," Florida Today, p. 16C, Nov. 8, 1986.]

<> Launch controllers at Kennedy Space Center on the morning of the Mission 51-L launch repeatedly waived temperature redlines, changing launch commit criteria in real time to accommodate extremely cold temperatures, according to launch control center transcripts included in a report by the House Science and Technology Committee.

The waivers were generated frequently and without technical analysis during the countdown, the report stated. "NASA personnel do not necessarily employ a sufficiently rigorous engineering analysis to the

"waiver of launch commit criteria during countdown." Kennedy launch officials, the report continued, were advised by the head of the ice inspection team not to launch Challenger the morning of the accident because of heavy ice on the fixed service structure at the pad. The NASA ice inspector was concerned that ice could break off and damage the orbiter or be ingested into the propulsion system.

On the morning of the 51-L launch, Charles G. Stevenson, head of the ice team, radioed the Kennedy Space Center director of engineering, saying, "The only choice you got today is not to go." Stevenson told the engineering director that the ice was large and dense enough to cause significant damage if it hit the orbiter. In a meeting following his pad inspection, Stevenson did not repeat his advice to Arnold Aldrich, shuttle program director. ["Transcript Reveals Launch Controllers Waived Challenger Temperature Warnings," Aviation Week & Space Technology, pp. 51-52, Nov. 17, 1986.]

November

November 3: NASA is returning to the numbering system for shuttle flights that prevailed through STS-9. When Discovery lifts off in Feb. 1988, it will officially be numbered STS-26. The numbering method NASA dropped was meant originally to convey more information; i.e., fiscal year that the cargo was scheduled to fly, location of launch site and the alphabetical order in which the launches occurred. When the launch schedule got off track, the numbering scheme became cumbersome and confusing. [Lafferty. Florida Today, p. 6A, Nov. 4, 1986.]

<> A successful practice countdown moved the Atlas-Centaur at Cape Canaveral Air Force Station a step closer to its November 21 launch. "We had a splendid practice countdown," said George Diller, NASA spokesman. "We didn't encounter any problems anywhere during the test. I think everybody is very happy with the way things went today." A "flight events demonstration" early next week will test the new guidance components and other electronics on the rocket. The original guidance components were removed after a factory audit revealed they came from what may have been a bad batch. [Lafferty. Florida Today, p. 6A, Nov. 4, 1986.]

November 10: Concerns about a primary computer led to the eighth delay in the launch of an Atlas-Centaur rocket, NASA announced. The delay stems from tests performed last week by Teledyne Systems Co. of North Ridge, CA, said NASA spokesman George Diller. The company was testing a computer nearly identical to that of the Atlas-Centaur when a power system failed. Depite the computer's flawless performance aboard the Atlas-Centaur during tests, launch officials decided to remove it in order to check for problems similar to those discovered by Teledyne. No decision has been made on whether to install a new power system. "This is a precautionary action," Diller said. "We don't want to commit this vehicle to launch until we understand why that (system) failed." [Lafferty. Florida Today, p. 1A, Nov. 11, 1986.]

<> KSC security guards on routine patrol at Playalinda Beach found two duffel bags containing cocaine and U.S. Customs officials found two others at Port

Canaveral. The cocaine, which was turned over to the federal Drug Enforcement Administration, had a total street value of $6.2 million. KSC spokesman Dick Young said this is the first time he has heard of cocaine being found on KSC beaches. Playalinda Beach has been closed to the public while Atlantis is on a nearby launch pad undergoing tests. [Lafferty. Florida Today, p. 1A, Nov. 11, 1986.]

November 11: A memorial honoring the seven Challenger crew members was dedicated before an audience of about 100 at Brevard Community College's Cocoa campus. The words beneath a black-and-gold plaque picturing the astronauts read: "Your contributions to the space program, your devotion to duty, your courage and your love of country will never be forgotten." Members of the U.S. Coast Guard's Cape Canaveral station were on hand to raise the flags. "BCC has many close ties to the Space Center," college President Maxwell King said. "Both institutions started out small and have grown tremendously. BCC also shares in the sorrow of the space shuttle Challenger. But we must go forward." The BCC Challenger Memorial, housed at Astronaut Memorial Hall, also includes four framed pictures and a glass case containing various photos and other memorabilia related to the ill-fated Challenger mission and its crew. [Moynihan. Florida Today, p. 4A, Nov. 12, 1986.]

November 13: Anita Moore, director of the Center for Career Development at Brevard Community College estimated that about 500 workers would take advantage of her free career counseling and job placement program for laid off KSC workers when it opened last month, but so far only about 125 persons have met the qualifications of the program funded by state and federal money. Some 42 workers have found new jobs through the $800,000 grant program. She theorized that the low turnout is either because workers are not aware of the program or are not looking for work. [Ash. Florida Today, p. 16C, Nov. 14, 1986.]

<> NASA officials said wreckage from Challenger will be buried in January in two 90-foot-deep missile silos at Cape Canaveral Air Force Station. The news media was being given one last look at the debris before its burial. Most of the debris is being stored at two locations at Kennedy Space Center. KSC workers are now placing the debris in boxes, which will be lowered into the silos after the first of the year. No media

representatives were allowed to view Challenger crew cabin wreckage which is stored in another KSC location apart from the rest of the wreckage.

In a related matter, NASA turned down requests by several news agencies for the space agency to release photos of the crew cabin that were taken on the ocean floor. The requests were made under the Freedom of Information Act, but NASA denied them, saying the space agency was considering the feelings of the families of the seven crew members killed in the accident. NASA said it was denying the requests under exemption No. 6 of the act, which says the release of personal and medical information "constitutes a clearly unwarranted invasion of personal privacy." Similar requests for autopsy reports on the crew members also have been denied under the same exemption. ["KSC Readies Shuttle Debris to be Buried in Missile Silos," Florida Today, p. 6A, Nov. 14, 1986.]

November 14: NASA announced it would try Dec. 4 to launch an Atlas-Centaur rocket carrying a military communication satellite on a mission which had already been scrubbed eight times. Barring further problems, the liftoff would occur at 9:04 p.m. from Cape Canaveral Air Force Station. The launch window extends to 12:02 a.m. Dec. 5. The most recent postponement was caused when engineers cancelled the scheduled Nov. 21 launch to double check the main computer. The precaution was taken after problems were found in a similar computer undergoing tests at the Teledyne Corp. plant in Northridge, CA, where it is built. The computer was removed from the rocket and shipped back to the plant where it has been recertified ready for flight, said NASA spokesman George Diller. The computer will be returned to Cape Canaveral next week. ["Atlas-Centaur Launch Scheduled for Dec. 4," The Orlando Sentinel, p. D-2, Nov. 15, 1986.]

November 17: A space shuttle launch drill to start at 7:40 p.m. today will include the first countdown at Kennedy Space Center since the Challenger tragedy. Atlantis's "dress rehearsal" will involve astronauts and ground technicians. ["Shuttle 'Rehearsal' Today," USA Today, p. 3A, Nov. 17, 1986.]

<> A $25 million security system plan for Kennedy Space Center is being finalized by top NASA top officials. The system calls for installing state-of-the-art

detection and surveillance devices designed to stop sabotage by KSC workers or outsiders, attacks by terrorist groups and intrusion by political protestors, according to NASA reports quoted by Florida Today.

"I would say right now that the security (system at KSC) is good," said Gary Wistrand, KSC's new chief security officer, who came to the space center in late September after serving as deputy security agent in charge of President Reagan's security detail. "I think that when the new system is brought in, (security) will be vastly improved" in terms of KSC's capability to detect threats and to speed-up response to neutralize any potential adversaries, he said. [Halvorson. Florida Today, pp. 1A-2A, Nov. 18, 1986.]

<> Lockheed Space Operations Co. recalled eight laid-off workers in the past week, but no more callbacks are scheduled in the near future, said company spokesman John Williams. No more employees are expected to be called back till next summer, when Lockheed gears up for shuttle missions planned for 1988, Williams said. [Haj. Florida Today, p. 9A, Nov. 18, 1986.]

<> At 7:40 p.m., KSC officials began a mock countdown for the shuttle Atlantis that will continue through 11 a.m., Nov. 18, when it will end with the simulated firing of the main engines. For the last two and one-half hours, five astronauts will be on board: Cmdr. Robert "Hoot" Gibson, pilot Charles Bolden, and mission specialists Franklin Chang-Diaz, Steven Hawley and George "Pinky" Nelson. All five were members of the last successful shuttle mission, 61-C, which ended Jan. 18. For about three hours, Nov. 19, NASA will conduct a crew-escape test with seven rookie astronauts, after which Atlantis will be returned to the Vehicle Assembly Building. [Haj. Florida Today, p. 9A, Nov. 18, 1986.]

November 18: Despite several technical problems that might well have scrubbed a real shuttle launch effort, the five-member astronaut crew aboard Atlantis said the experience brought back "a bunch of very, very fond memories." Pilot Charles Bolden said, "It was almost like deja vu." Cmdr. Robert "Hoot" Gibson said, "We felt it was a real good test...everything went pretty well."

The site of the orbiter on Launch Pad 39B, Gibson acknowledged, stirred memories that aren't as fond as his recollections of Columbia's [61-C] flight, Jan. 12 - Jan. 18. "I think it's going to be very difficult to look at an orbiter or look at the launch pad" without remembering the Challanger crew and the tragedy, he said. "They were our companions. They were our very close friends. And I don't think I'm ever going to quite get over that completely." "I decided a long time ago," he added, "I was going to keep going and that I want to (fly on the shuttle again)."

The fact that the countdown was halted 25 seconds short of the simulated main engine firings because of computer software problems does not diminish what NASA was trying to accomplish during the exercise, Gibson said. "I think the fact that we got some problems during the countdown made it a much more useful simulation that it would have been had we just proceeded right on down to T-zero," he said.

Two computer problems arose during the countdown, said NASA spokesman Jim Ball. One was with a mission operations computer at Johnson Space Center in Houston, which sends data to the shuttle on the ground and during the flight. That problem was remedied quickly and the computer supported the remainder of the countdown, Ball said.

The other problem was with the computer software in the Launch Control Center at KSC. Software normally used during launch countdowns was changed - or "patched" - because the orbiter was without its main engines, Ball said. He added that officials were concerned that the patched software might not perform as expected and result in damage to flight hardware. Therefore, launch officials chose to stop the count at T-31 seconds, which is when computers automatically take charge of the launch. "What stopped (the countdown) was caution," Ball said. "We didn't want anything unexpected happening." [Halvorson. Florida Today, pp. 1A-2A, Nov. 19, 1986.]

<> NASA reported that Kennedy Space Center's 1986 spending in Florida rose by 10 percent, despite the Challenger accident. The same report also showed that NASA greatly increased its expenditures with Brevard County companies, even though some Central Florida economists blamed the area's economic slowdown on the grounded

shuttle program. The report, however, does not reflect the most recent KSC layoffs. [Hinman. The Orlando Sentinel, pp. B-1 & B-6, Nov. 19, 1986.]

November 20: Seven rookie astronauts participated in a crew emergency simulation conducted at Kennedy Space Center's Launch Complex 39B and using Atlantis which is currently on the pad. NASA officials said the disaster drill will help improve safety in the aftermath of the Challenger tragedy.

"The simulations were very realistic and well-orchestrated by the people in charge," said NASA launch director Gene Thomas. "We learned an awful lot about where improvements can be made."

The mock emergency was declared in the morning just as the astronauts were entering Atlantis. Those participating in the drill were: Cmdr. Frank Culbertson, pilot Stephen Oswald, mission specialists Carl Meade, Kathryn Thornton and G. David Low, and payload specialists Pierre Thuot and Jerome Apt.

NASA officials simulated a fuel leak in the shuttle's reaction control system and then looked on as fire and rescue workers rushed to the scene from a station about a mile away from the pad. The simulated spill involved hydrazine, a toxic chemical that could incapacitate an astronaut in a real emergency. The drill included simulated injuries to an astronaut, a quality control inspector and two members of the crew that assists the astronauts into the orbiter.

Within six minutes, a fire and rescue team was at the pad helping the astronauts and pad workers put on breathing apparatus. The "injured" were carried across a platform to wire baskets at the cabin level of the pad, 147 feet above ground. The astronauts and support personnel - 19 in all - entered the baskets but didn't ride them to the ground. Officials said the ride was too risky to attempt except in a real emergency.

The baskets were filled with sandbags and sent to ground level. The drill participants rode an elevator to the ground and re-entered the baskets. After leaving the baskets, "uninjured" astronauts scrambled to a protected bunker near the pad and rescue workers

hurried the "victims" into three armored personnel carriers, which then drove to a nearby heliport. One carrier broke down and a van was used instead.

Stand-ins for the injured then were transported by helicopter ambulance to three Central Florida hospitals. The drill concluded Atlantis's testing on the pad. "We had a very good visit to the pad," Thomas said. "Whenever we have a shuttle considered safe to fly again, we'll be ready to launch it." Atlantis is scheduled to roll back to the Vehicle Assembly Building early Nov. 22. [Halvorson. Florida Today, p. 1A, Nov. 21, 1986.]

November 21: An English teachers group named NASA and two contractors for the space shuttle winners of the 1986 Doublespeak Award for the year's most glaring example of deceptive language. William Lutz, chairman of the National Council of Teachers of English, said the language used by officials of NASA and the contractors in discussing the Challenger tragedy and the subsequent investigation "was filled with doublespeak."

Lutz quoted a NASA official who said: "The normal process during the countdown is that the countdown proceeds, assuming we are in a go posture, and at various points during the countdown we tag up the operational loops and face to face in the firing room to ascertain the facts that project elements that are monitoring the data and that are understanding the situation as we proceed are still in the go direction."

Rockwell International, the main contractor to build the shuttle, and Morton Thiokol, the maker of the booster rockets, were also cited by the teachers. ["NASA Jargon Wins '86 Doublespeak Award," Florida Today, p. 8A, Nov. 22, 1986.]

<> NASA workers began moving Atlantis back to Kennedy Space Center's Vehicle Assembly Building from Launch Complex 39B where it has been for the past seven weeks. ["Atlantis Removed From Pad," Florida Today, p. 8A, Nov. 22, 1986.]

November 22: About 8,000 runners and walkers took to the streets in 51 Florida counties for the Astronauts' Memorial and Educational Center to be built at Kennedy Space Center. Organizers said the 1986 Florida Challenger 7K Run/Walk-A-Thon served well as the Astronauts' Memorial Foundation's first major project. Mor than $110,000 was raised.

"This was a first-time event so it was hard to develop goals or say if they were met, but personally, I'm ecstatic about the way it turned out," foundation president Alan Helman said. "It's important that the community has an outlet like this to express its support for this project," said U.S. Rep. Bill Nelson (D-Melb., FL), who ran the 4.3 mile course in slightly more than 35 minutes. KSC Deputy Director Tom Utsman, who also participated in the event, said the memorial will be "an addition to the whole nation, not just the area." [White. Florida Today, p. 1A, Nov. 23, 1986.]

November 23: Playalinda Beach was reopened to the public by NASA following the rollback of the space shuttle Atlantis to the Vehicle Assembly Building. Kennedy Space Center officials said that the beach will probably not be closed again till shuttle flights resume early in 1988. [Cason. Florida Today, p. 1B, Nov. 24, 1986.]

November 28: PRC Systems Services expects to lay off about 200 employees at Kennedy Space Center in December and January but the company believes that most will be re-employed in the same jobs by other contractors. Company spokesperson Janet Bonder said the layoff will occur because their work will officially come under the supervision of other contractors in the coming months. "This is all in the long-range planning," she said, referring to NASA plans to award a new contract for processing shuttle payloads and the effect of the BOC and SPC contract consolidations in 1982 and 1983. [Hinman. The Orlando Sentinel, p. C-1, Nov. 29, 1986.]

November 30: Monthly attendance at Spaceport USA, the Kennedy Space Center's visitors center, reached a record high this year when an estimated 123,000 persons visited the attraction. The November figure marks the sixth month this year that all-time visitor attendance records have been toppled, and is the highest of any November since turs of the center started in 1966. The previous November high for the Spaceport was in 1983

when 111, 276 people came. Cumulative attendance for the year is also running at a record pace with more than 1.9 million visitors by the month's end. [Varnes. NASA/KSC News Release No. 146-86, Dec. 1, 1986.]

December

December 1: After eight delays NASA will attempt a night launch of an Atlas Centaur rocket Dec. 4. The Atlas flight has had its problems, including suspected faults in the main computer and guidance system which led to the launch postponements. Liftoff is scheduled for 9:04 p.m. from Cape Canaveral Air Force Station and should provide a light show for residents of Central Florida. The launch window extends till 12:02 a.m., Dec. 5. "It would certainly be a good way to end the year," said James Womack, chief of operations for the Atlas launch. "We've been down here a long time." [Glisch. The Orlando Sentinel, p. A-1, Dec. 2, 1986.]

December 2: NASA is expected this week to award a three-year, multimillion-dollar contract for payload processing at Kennedy Space Center, according to contractor and space agency sources. KSC officials met in Washington, D.C., today with James Fletcher, NASA Administrator, to discuss contract bids submitted by McDonnell Douglas Astronautics Co. and Boeing Aerospace Operations Co.

The agreement will consolidate work now performed under six separate KSC contracts involving some 900 workers. The majority of current payload processing activity is now carried out by McDonnell Douglas. Boeing, Computer Sciences Corp., EG&G Florida Inc., and Planning Research Corp. also do portions of the work.

NASA officials have said the purpose of consolidating the work is to obtain a single, long-term contract for payload processing activities at KSC. The consolidated contract is expected to reduce costs, while increasing efficiency, effectiveness and safety. The winner of the contract will be responsible for preparing all payloads for launch aboard shuttles or unmanned launch vehicles. The contract calls for assembling, testing and transporting payloads at KSC. Other work includes operations, maintenance and engineering at KSC payload processing facilities.

The first three-year contract will include optional extensions which could extend the contract up to 15 years. Contract obligations begin Jan. 1, 1987. [Ash. Florida Today, p. 1A, Dec. 3, 1986.]

December 3: Kennedy Space Center's payload processing contract was awarded to McDonnell Douglas Astronautics Co. over its lone rival Boeing Aerospace Operations Co. McDonnell Douglas workers weree told about the award by company Vice President and General Manager George Faenza, said spokeswoman Pat Oliver. The six-year $327 million contract may be extended for up to 15 years.

About 880 workers with McDonnell Douglas, Boeing, Computer Science Corp., EG&G Florida Inc. and Planning Research Corp. are now performing the work. But about 1,100 workers eventually will be needed under McDonnell Douglas' consolidated contract, said NASA spokesman Dick Young. The director of payload management, John Conway, said that the contract would have no immediate effect on employment at KSC. [Ash § Bixler. Florida Today, p. 1A, Dec. 4, 1986.]

December 4: NASA's 9:30 p.m. launch of an unmanned Atlas-Centaur rocket from Cape Canaveral Air Force Station was the fourth successful U.S. launch in four tries. NASA"s last launch of 1986 was a $125 million Fleet Satellite Communications - FLTSATCOM - satellite. Jim Ball, NASA spokesman, said "It certainly is a good way to bring the year to a close. We had an excellent liftoff. It was great. It was beautiful." Liftoff came 26 minutes later than planned because of a problem with equipment used to track the flight of the spacecraft. [Halvorson & White. Florida Today, pp. 1A-2A, Dec. 5, 1986.]

December 6: Ten Young Cosmonauts from the Soviet Union and the man who holds the world record for time spent in space will be in Florida this week to visit Kennedy Space Center and other state attractions. The visit is the second part of an exchange which last year saw ten members of America's Young Astronauts program tour Russian space facilities. The exchange came about from the 1984 meeting between President Reagan and Soviet leader Mikhail Gorbachev. [Halvorson. Florida Today, p. 1B, Dec. 7, 1986.]

<> Spaceport USA will this week erect displays on the subject of space technology uses on Earth. "We want to show these things to the public on a generic basis. Whereas a lot of the benefits from the space program have come in the form of advances in computer technology, these are things that are actually in the marketplace that they're using on a day-to-day basis,"

said Arnold Richman, chief of NASA's Visitors Services.

"We've always had a spinoff exhibit, but these new ones will be much better and set off in one gallery of the Galaxy Theater. One of the things that any attraction goes for is repeat business and we feel this will help. It will also give us something new to talk about," said George Meguiar, Spaceport's marketing manager. [White. Florida Today, p. 1B, Dec. 6, 1986.]

December 7: All shuttle crew escape methods currently under review would cause NASA to miss its target of Feb. 18, 1988, for launch of the shuttle Discovery in the first post-Challenger mission. Instead, officials at the space agency said that installing a bailout system would most likely scrub the first liftoff until at least the summer of 1988. Robert "Hoot" Gibson, commander of the last successful shuttle mission [61-C] said, "I think we will not fly again before we have something in the orbiter to at least give you some chance of getting out." [Glisch & Scherberger. The Orlando Sentinel, pp. A-1 & A-6, Dec. 8, 1986.]

December 8: Bionetics Corp. (Hampton, VA) was awarded a three-year, $9 million contract extension by NASA for laboratory and environmental support services to the Biomedical Operations & Research Office at Kennedy Space Center. Bionetics will continue to operate the space center's clinical and physiological stress laboratories where research work is done for muscle and exercise pysiology and cardiovascular conditioning. The contract covers the period of Oct. 30, 1986, to Oct. 30, 1989, and brings the total value of the contract to $17.5 million.

December 9: Kennedy Space Center Director Forrest McCartney will be awarded an honorary doctorate of science degree Dec. 13, at the Florida Institute of Technology's graduation ceremonies, it was announced today. McCartney will speak to the approximately 300 graduates in the Percy Hedgecock Gymnasium at 9 a.m. ["Space Center Director Will Address FIT Grads," The Orlando Sentinel, p. C-4, Dec. 12, 1986.]

December 10: NASA will commemorate the first anniversary of the Challenger tragedy and the deaths of other on-duty astronauts by observing 73 seconds of silence at all agency offices Jan. 28. It will be an annual

observance. The period of silence, lasting as long as Challenger's flight, will begin at 11:38 a.m. and flags will be lowered to half staff at all NASA installations, according to Shirley Green, chief of public affairs for NASA. No other agency observances are planned next month, but NASA employees may hold other remembrances, Green said. "That's really it," she said. Administrator James Fletcher "felt it was appropriate for all NASA centers to observe the date the same way as a NASA family." [Fisher. The Orlando Sentinel, p. A-3, Dec. 11, 1986.]

December 12: Ali Abutaha, aerospace consultant (Reston, VA), claimed in an interview that photographic analysis of Challenger's right solid rocket booster showed that it might have started breaking apart 16 seconds before the explosion. Abutaha believes that an excessive liftoff load on the shuttle's right strut, which connects the booster to the external tank, may have caused it to break apart. He plans to meet with L. Michael Weeks, NASA deputy associate administrator for space flight, to discuss his findings, said NASA spokeswoman Sarah Keegan. "He has presented more than one theory over the months," she said. "As we have done with the others, we will sit down and look at it very carefully." [White & Kelley. Florida Today, pp. 1A & 2A, Dec. 13, 1986.]

<> Kennedy Space Center hosted ten teen-age members of the USSR's Young Cosmonaut program on a tour of the space center. They were accompanied by veteran Soviet cosmonaut Vladimir Solovov, who spent a record 237 days orbiting Earth aboard his Salyut 7 in 1984. [Glisch. The Orlando Sentinel, pp. A-1 & A-8, Dec. 13, 1986.]

<> Kennedy Space Center will create a top division for safety, quality assurance and reliability as part of a major reorganization to streamline shuttle management and to improve communication at the launch center, said NASA today. The KSC changes involve new assignments for nearly every top shuttle official, most of whom were involved in the Jan. 28 launch of Challenger.

Gene Thomas, launch and landing director, was made director of the center's new Safety, Reliability and Quality Assurance wing. He'd served as launch director for mission 51-L.

In addition, the KSC realignment calls for combining shuttle operations and shuttle engineering work under one division, reflecting a similar change at NASA headquarters. This change is intended to improve communication by making reporting channels more direct and explicit, a need cited by the Challenger commission.

Thomas Utsman, KSC Deputy Director, will keep his present job but will also head the new division as director of Space Transportation System Management and Operations "through the next few shuttle flights,' according to the NASA press release. Utsman will work with NASA headquarters to coordinate KSC's processing work.

Robert Sieck, who presently heads KSC's shuttle operations, will report to Utsman as launch director. George Saseen, manager of Advanced Projects, Technology and Commercialization Office, will become engineering director. Thus, Sieck and Saseen will be the "primary directors" of KSC shuttle tasks and will work with Utsman to manage shuttle processing.

Other administrative changes include: Marvin Jones, director of safety, reliability, quality assurance and protective services, will head a new Protective Services Office that will report to Center Director McCartney. William Rock, deputy director of shuttle operations, was named manager of the Advanced Projects Technology and Commercialization Office. James Womack, chief of the Centaur Operations Division, will be in charge of expendable launch vehicle operations. [Fisher. The Orlando Sentinel, pp. A-1 & A-10, Dec. 13, 1986.]

December 13: Kennedy Space Center Director Forrest McCartney told Florida Institute of Technology graduates that KSC was moving steadily and carefully toward resuming shuttle flights. Lt. Gen, NcCartney was commencement speaker at FIT's graduation ceremeonies in Melbourne, FL. "Our country, indeed our world, has an urgent need to get the space shuttle flying again. We still have a great deal to accomplish before we can fly the shuttle again," McCartney told the students. "The schedule is tight, and when we resume shuttle flights, there will still be many sophisticated high-tech problems to challenge us as we

continue to probe the vast frontiers of space."

After the ceremony, McCartney, who has headed KSC since Oct. 1, said space center managers are examining their work force needs and laid off workers may be back to work sooner than planned initially. "We are going to try," said McCartney, "to do all we can to make sure those employees are back again as soon as we can. I can't give you any definite time period now but, yes, I think that will be the trend." [Bellido. Florida Today, p. 1B, Dec. 14, 1986.]

December 14: A review of NASA's quality-control program found the operation used to monitor shuttle safety hampered by manpower shortages and several workers who didn't grasp certain aspects of their jobs. Important changes are now under way to solve the safety problems and toughen methods used to prepare shuttles for launch. By late February, the first of 250 new NASA inspectors should be on the job; an new paperwork system detailing work rules and management changes to keep closer tabs on the operation will also be in effect. [Glisch. The Orlando Sentinel, pp. A-1 & A-9, Dec. 15, 1986.]

<> Kennedy Space Center awarded a $193,633 contract to Orlando-based Apollo Computer Inc. to provide computer workstations, software, training and documentation for an Engineering Technical Base project designed to apply knowledge-based expert system techniques to the launch pad B environmental control system.

Knowledge-based expert systems draw upon computer programs created around the experience and wisdom of specialists in specific disciplines. The programs can be used by computers to exercise the flexible reasoning processes normally attributed to human beings. The project will develop on an environmental control system simulator in the engineering development laboratory. The contract requires Apollo to complete all work within six weeks after receiving notice to proceed. ["Apollo Receives NASA Contract," Florida Today, p. 16C, Dec. 15, 1986.]

<> Plans to move debris from the Challenger into long-term storage may be delayed till lawsuits arising from the accident are settled. The debris had been scheduled to be buried in two empty missile silos at Cape Canaveral

Air Force Station beginning next month. Elliot Kicklighter, debris storage manager at Kennedy Space Center said, "Personally, I don't think we need to delay putting the debris in long-term storage. We've designed the system so everything will be retrievable." [Brown. Florida Today, p. 6A, Dec. 15, 1986.]

December 15: Eighty percent of Planning Research Corp.'s Kennedy Space Center work force will get layoff notices by Jan. 15, eliminating 80 more positions than the company anticipated two weeks ago, said company spokeswoman Janet Bonder. About 140 of PRC's 350 engineers and support personnel will receive pink slips Jan. 2, followed by 140 more on Jan. 15, said Bonder.

"We hope on getting the majority of our staff new jobs before their notices take effect. The ones who will be laid off have already been told, so they can be searching over the holidays," Bonder remarked. She said further that the PRC lost jobs to all three major space center contractors: EG&G Florida Inc., Lockheed Space Corp. and McDonnell Douglas Astronautics Co.

A spokeswoman for McDonnell Douglas, which recently won the $387 million payload processing contract, said the company "had no plans for significant hirings in 1987." Lockheed expects to have 50 to 75 engineering specialties positions open in Jan., but declined to make a hiring commitment. "We'll certainly interview and talk with PRC people," said Lockheed spokesman Stuart Shadbolt. "But I can tell you we don't plan on any new hirings of more than one or two people in January and February."

The remaining 70 PRC workers are under contract till Sept. 1987. [Tucker. Florida Today, p. 1A, Dec. 16, 1986.]

<> Air Force Col. Edward O'Connor, director of operations for the 6555th Aerospace Test Group at Patrick Air Force Base and director of the Challenger debris search, announced that he will retire from the military next year. O'Connor, 47, said he plans to pursue options in private space-related industries or with NASA. "I want to stay involved (in the space program)," he said. "I think there are a lot of good things that are going to be introduced into the space program in the near future, and I want to get involved

in them. I'm going to be looking for some of the new ventures that are coming up in the space business. There are many new launch vehicles coming up, a lot of spacecraft activity and a lot of new initiatives with the shuttle." O'Connor and his wife, Barbara, live on Merritt Island. [Halvorson. Florida Today, p. 12A, Dec. 16, 1986.]

December 18: Lockheed Space Operations Co. improved its performance rating at Kennedy Space Center in the six-month period ended Sept. 30, NASA said. Based on factors such as safety and resource management, NASA rates contractors on a six-level scale from unacceptable to superior. Lockheed's rating went up a notch from "very good" to "excellent." As a result, the company was awarded a profit of $1.1 million for the period; the amount represented 84% of its potential award for work performed at the space center. [Hinman. The Orlando Sentinel, p. C-1, Dec. 19, 1986.]

December 19: Installing a crew escape system in the Discovery before its scheduled launch Feb. 18, 1988, is a "90 percent bet," said Shuttle Flow Director Tip Talone. The system is among q00 modifications set for the orbiter; 30 of the changes must be in before launches resume. "The astronauts have final vote on all changes, and I just can't imagine them giving this (an escape system) up....Our scheduling for a Feb. 18 launch hasn't taken into account installing an escape system, but I don't think it would set us back," Talone said. "Discovery is being tested like it's never left the ground. We've got problems with about 30 of the modifications. I'm not making promises, but it looks like we'll get work schedules, money and new hardware all together on time." [Tucker. Florida Today, p. 1A, Dec. 20, 1986.]

December 22: McDonnell Douglas Astronautics Co. was named Large Business Contractor of the Year" by Kennedy Space Center. McDonnell Douglas, which processes shuttle payloads, was recognized for exceeding its goals in utilizing small business and small-disadvantaged businesses and in its business outreach program.

Santa Cruz Construction, Inc. (Merritt Island, FL), for the second straight year won the "Small Business Minority Contractor of the Year" award, for construction of a 500-car parking area. Joan F.

Kennedy Inc., (Cape Canaveral, FL), received the "Woman-Owned Business Contractor of the Year" award for professionalism and expertise in stalling the Orbiter Modification Refurbishment paging and warning system.

The "Small Business Subcontractor of the Year" award went to BAMSI Inc., (Titusville, FL), for support services for engineering, drafting, publications, information services and housekeeping at Vandenberg Air Force Base, Calif. This marks the third time BAMSI has received this award. ["KSC Contractors Receive Awards," Florida Today, p. 14C, Dec. 23, 1986.]

December 26: NASA's Kennedy Space Center awarded Costello Construction Co. Inc. (Merritt Island, FL) a $156,000 contract for construction work on the new Engineering and Development Prototype Facility at KSC. Completion is scheduled for April 1987. ["Costello Wins Contract," Florida Today, p. 16C, Dec. 26, 1986.]

December 31: EG&G Florida Inc. was awarded a one-year, $129 million extension of its base operations contract at Kennedy Space Center. The extension period runs from Jan. 1 through Dec. 31, 1987, and brings the total value of the contract to $565 million. The contract, awarded in 1983, has been extended five times.

"Good news is hard to come by these days, and this is good news," said Peter Chapski, director of communications at EG&G's headquarters in Wellesley, MA. Chapski said, further, that the extension will "improve" the chances that 173 EG&G workers laid off due to the Challenger tragedy ultimately will be recalled. "The outlook for recalling those workers is better, but I wouldn't say that (the contract extension) would accelerate the recall," he said. "Our work at the site will increase more (in 1987) because there will be more preparatory work to get done" before the shuttle launches resume in Feb. 1988. [Halvorson. Florida Today, p. 1A, Jan. 1, 1987.]

<> Kennedy Space Center attracted an estimated total of 2,142,785 tourists this year, making 1986 the busiest year ever experienced since public tours began in 1966. In 1985, KSC hosted 1,795,857 tourists. NASA spokesman Mitch Varnes said the space center was probably getting some of the "spillover" from Disney World where tourists had been turned away because of the crowds. [Carey. The Orlando Sentinel, pp. A-1 & A-5, Jan. 1, 1987.]

Appendix 1

There were four expendable rocket flights launched by NASA during 1986; three of these were successful. The major NASA launches which delivered their payloads to orbit included: Delta 100, a mission for the Strategic Defense Initiative; Atlas Centaur 66 with the FltSatCom F-7 Navy communications satellite; and a Scout rocket with the Polar Beacon Experiment and Auroral Research satellite, a research spacecraft designed to help future communications and weather satellites avoid interference caused by the Aurora Borealis. The spacecraft was nicknamed "Polar Bear."

The only major NASA expendable vehicle failure during 1986 was that of Delta 178 at Cape Canaveral with the GOES-G weather satellite being launched for NOAA. Loss of the rocket was assigned to a short circuit in the first stage electrical system. The result was a premature main engine cutoff. This was only the twelfth Delta failure of the 170 missions launched since 1960. There had been 43 previous consecutive successes.

1986 NASA Expendable Launch Summary

Kennedy Space Center:

May 3 Delta/178 GOES-G weather satellite (vehicle failure)

Sept. 5 Delta 180/ SDI payload

Dec 4 Atlas Centaur 66/ FltSatCom F-7

Vandenberg Air Force Base:

Nov. 13 Scout/ Polar Bear (polar Aurora Borealis study)

[Diller. NASA/KSC News Release No. 152-86, Dec. 23, 1986.]